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Conference Proceedings
BOOK OF FULL PAPERS

Editors

Assoc. Prof. M. Veysel Kaya
Dr. Patrycja Chodnicka-Jaworska


HOLIDAY INN VIENNA CITY
9-11 APRIL 2019
Vienna, AUSTRIA
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BC GRUP A.S.

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Social-Psychological Characteristics of Trust in Modern Georgian Society

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Abstract
The purpose of this research was the empirical study of the social capital of the Georgian society. The level of social capital is determined by the only comprehensive cultural characteristics - confidence level, which is expressed both on individual and social levels. Consequently, the definition of social capital includes social connections and networks, social norms, public interaction and intimidation, as well as the integrity of trust, inherent complexes, chemical discharges, aggregates and expectations that unite the community, co-workers Lobby, and thus promotes progress (Putman, 1996). According to Franz Si Fu Kyama, trust is determined by progress. "The well-being of the nation, as well as its competitiveness, is based on the only comprehensive cultural characteristic- the level of confidence that the society has" (Fukuyama, 2004, p.129) Georgian culture has traditional orientation towards spirituality, culture and society have traditionally characterized the highlights of the qualities and skills that the international community now combines into the social capital concept. It is acknowledged that one of the most destructive consequences of the Soviet Socialism was the complete destruction of civil society. Based on the results of the theoretical analysis that the post soviet society is left without a trust we should assume that the Soviet period has not passed. The research was intended to check this hypothesis. Consequently, a questionnaire established by the Likert's Scale Principle was used to assess the level of trust, confidence, and willingness to trust and respect for other people. The findings of the survey showed that the Georgian society is low as trust level. The social capital deficit, in turn, has serious social problems, since it is a prerequisite precondition for the successful work of democratic political institutions.

Keywords: Social capital, Disposable mood, Expectation of justice, Level of trust and Willingness to trust.

Research Methods
Based on a theoretical analysis, the trust is defined as a disposable mood with a diligent valuation, the components of which are trust and confidence, and the expectation of security and protection. Only bilateral confidence can not be a guarantee of security. Such a guarantee is at least a belief that other people will be treated fairly. Therefore, one more component is the expectation of justice. The mood characteristics of this mood determine the general confidence.

From the existing methods of measuring the characteristics, the most popular scales are Thurstone and Likert's. Consequently, two questions arranged by the principle of the Laker's skill were used to measure the level of trust,

1. Confidence willingness: "To what extend do you trust to other people?"
2. Confidence willingness: What do you think to what extend people trust each other?
   It is also worth mentioning that such questions are included in the World Questionnaire, whose results are used to study social capital.
3. Waiting for Justice: "Do you think the majority of people will try to oppress you if they are given a chance to do it right?"
The survey was carried out in Tbilisi and 1034 persons were interviewed in 18-70. The data obtained from the survey were developed using non-parameter and parameter methods, as well as multi-dimensional methods of mathematical statistics, through the computer program package of mathematical statistics - SPSS.

The results of the empirical study of confidence building and acceptance
Trust with other people (willingness to give confidence). The result is presented in the graphical form as a whole selection.
As we can see, the distribution of answers is not equal. Only one third of the respondents trust family members only; Only 10% are ready to trust the majority. It is important to note that the number of people who have difficulty answering the question (more than one quarter) are high.

To what extend do you trust to other people?

Table. 1

As stated above, the selection of questionnaire was chosen by Likerts's scales to give the average score of the average calculation, which, in turn, gives us the opportunity to compare the subgroups of different stages. Confidence willingness. As it was already said, trust is a positive disposition towards other people and is focused on bilateral relations (coagutantia), or similar attitude towards other people, because only bilateral security is a guarantee of security. In this case, the study was developed using the principle of the Likerts's scale.

What do you think to what extend people trust each other?

Table. 2

Thus, the conclusion is that the readiness of trust in the Georgian society is quite low: in the opinion of the respondents, only 11% trust others and 17% to friends. About one-third of the questions were difficult to answer, and one-fourth only trusted family members.

Comparison of trust and willingness to accept.
The next stage of material processing was to find out whether the coordination of trust (bilateral), or confrontation of trust and willingness, is characterized. As we have already said, coordination is a guarantee of safety and security.

Confrontation of trust and willingness (according to median)

Thus, as the results show, the difference between confidence building and acceptance is not statistically trustworthy. As expected, the correlation between these two variables is quite high.

Thus, in the form of a conclusion, it is said that the willingness and acceptance of confidence is generally bilateral, coordination is characterized.

In the next stage of data processing the selection segmentation was made according to these two variables which allow for different types of selection. Cluster analysis was conducted for this purpose.

Types of giving and willingness of confidence

Thus, the most numerous (42%) subgroup is of both variables low (only relies on trust to family members); The most rare (11%) occurrences are the first variable and the higher the second variable. In the case of the majority of respondents (69%) trust is congressional.
Results of the Empirical Survey of Satisfaction Expectation. As the research has confirmed, trust as a psychological variable has a complex constituent nature. This is a disposable mood with a deductible valuation, the components of which are trust and confidence to guarantee safety and security. But it is clear that only confidence bilateral security cannot be a guarantee of security. It is such a guarantee that at least you will feel that other people will be treated fairly.

As e. Aronson writes, there's something around us, every day we hear the story of various calamities. Do you deal with this constant reminder that life is not only good? "[7 p. 139]. One way to do this is to convince yourself that you will never have a bad thing.

Thus, I am confronted with injustice and meets the perceptions of the law: the man is trying to avoid the information that destroys "the millions of mushrooms." This form of perceptual protection is closely related to another form of protection - "unrealistic optimism" when a person believes that his life is more difficult than bad [15; P. 142]. With the collapse of the belief of the Universal justice, a human is occupied by the feeling that he or she does not have a control of events, that respectively leads to apathy – when human behavior reminds us the one of a "victim". Aforementioned was claimed by M. Saligman who described phenomenon “learned helplessness”. This belief makes you aware of or reject any of the infinity and, Multilateral coefficient of behavior.

The expectation that the other person will be fairly justified is one of the mainstays of the beliefs of the universe and is supposedly the main component. Consequently, the empirical study of this issue is interesting in terms of studying this mechanism of penitentiary protection.

Will most of the people try to oppress you when they give an opportunity of it or they just behave contrary?

Table 5

If we generalize the results, this, perhaps, means that the mechanism of perceptual protection, such as the belief of universal justice, is less effective. Apparently, this is one of the most unavoidable consequences of poor socio-economic conditions in the country. This new social context resulted in a very sharp separation of the “poor and wealthy” and thus socio-economic inequality. It is very likely that the population which is got used to living in „Equalization“ conditions, perceives current conditions as social injustice, especially if we consider that most of the population is poor.
In the previous stage of data processing, selection segmentation was carried out according to the willingness and acceptance of trust. There are four different subgroups: two subgroups between these two variables in conjunction with each other (variable high and second variables or vice versa). Therefore, it was necessary to find out what the expectation of justice is in each of these subgroups. The results are presented in Table 6.

**Table 6**

<table>
<thead>
<tr>
<th>Trust</th>
<th>Expectation of justice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give high confidence-high willingness of confidence</td>
<td>0.34</td>
</tr>
<tr>
<td>Give high confidence-low willingness of confidence</td>
<td>-0.07</td>
</tr>
<tr>
<td>Give low confidence-high willingness of confidence</td>
<td>-0.33</td>
</tr>
<tr>
<td>Give low confidence-low willingness of confidence</td>
<td>-0.41</td>
</tr>
</tbody>
</table>

In order to test statistical credibility, the factor was "subgroup according to the willingness and acceptability of the trust" and the dependent variable - "Satisfactory expectations", which confirmed the reliability of the distinction between the groups (F = 3.216; p = 0.035). The difference between subgroups was examined through apotteral criteria, namely, the chef's tests.

Subsequently, the two sub-groups were higher and lower in expectations of justice: first came into the top (high confidence-building - high confidence) and the second (high confidence - low confidence) subdivisions, and another - third (low confidence - high confidence) And the fourth (lower confidence-giving - low confidence). However, in addition to the expectation of different justice, the first and the second subdivision differs from the willingness of the trust: the first is the highest in the first, and the lower the other. Consequently, this means that direct and direct relationship between the expectations of justice and the willingness of trust is granted. Unfortunately, based on an empirical (correlative) study, it is impossible to discern the cause-cause dependence between these two variables.

Consequently, the results obtained confirm the research hypothesis that trust is a psychological phenomenon. Confidence-dependent sentiment implies both congressionality (willingness to receive confidence) and security (expectation of justice).

**Conclusion**

Based on the conducted empirical research, the following conclusions can be made:

1. Confidence is a complex psychological phenomenon - a disposable mood with dual validity, the components of which are give confidence and willingness of confidence, as well as expectations of safety and protection, which, in turn, implies The small, expectations that other people will do to you fairly.

2. The willingness to give confidence in Georgian society is quite low: most people trust only 10%. It is surprising, but in the country where the cult of friendship is declared, only 22% of the respondents trusted friends. It was difficult for a quarter to answer, and more than one third of them trusted family members.

3. In the Georgian society, the willingness of confidence is quite low: 11% of respondents trust to others and 17% only friends. About one-third of the questions were difficult to answer, and one-fourth only trusted
family members.

4. Four groups have been allocated as a result of clustering analysis, based on confidence building and acceptance. The largest number (42%) is grouped with a low percentage of both variables (consistent with confidence only to family members): 27% of the respondents in the group's high value ("trust friends") entered the group, while the group was the lowest and second variable with the first variable - 20%. The most rarely (11%) are individuals with low levels of confidence and high confidence levels. Fair expectations are fairly low (-0.3). The expectation of justice and willingness to give confidence is directly and direct relationship: trust increases the rise of fair expectations and, on the contrary, the rise of the first will increase the other.

5. The expectation of fairness is higher in those groups, where higher confidence and willingness are taken, as well as the willingness to give confidence and the willingness of trust is low.

6. The low level of fairness presumably means that such a mechanism of perceptual protection, such as "belief in the universe," is less effective.

7. Low level of trust in both individual and social levels. Also, the low level of self-organizational ability gives us the right to conclude that the Georgian society faces an obvious lack of social capital. The outcome of the survey confirmed the hypothesis of the research: the Soviet period has not passed on: in the Georgian society, trusts are similar to other poetry countries, and the civil society is well established.

References


Ecofeminism in the Context of Women and Ecology

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Abstract

As the ecological problems reach the global scale and threaten all living things, this problematic has been placed on the agenda of the world in the late 20th century and feminists' attention was directed towards ecology movements. As a result of this process, a new trend emerged, which gave a different dimension to Western women's studies in the 1980s: Ecofeminism. Ecofeminism has emerged on the axis of nature and women. The main problem of eco-feminism is that men hold women and nature and dominate them. Criticize patriarchy and woman's subordination. Ecofeminists believe that their most important task is to transform the world created by male domination into another optimistic world. This theory has important propositions rejecting all kinds of domination over nature and women.

Keywords: Woman, Nature, Ecology, Feminism, Ecofeminism

Introduction

Feminism is based on two basic ideological beliefs: The first one is to demand the elimination of the disadvantaged position of women due to their gender, that is, social gender, and the second is the variety of views and political positions. (Heywood, 2016:310). Which is, the spread of women's movements on variety of issues such as the women to be entitled to right elect and be elected in public sphere, the increase in the number of female managers both in public and private areas, legalization of abortion. In this movement, women defending the gender equality in all areas and oppose the masculin ideas and men to oppress women. (Tekin, 2012:1239). According to MacKinnon, feminism is a theory that has been based on the idea that women unfairly subject to inequalities against men due to the social meaning of bodies. (MacKinnon, 2003: 57).

Feminists' interest in the ecology movement began to increase in the second half of the 20th century as environmental problems came very close to the treshold of danger. Thus, with the rise of ecological demands, In particular, after 1980s, ecofeminism has developed as a separate branch in women's studies in the West. The idol of ecofeminism which came into existence through the idea that feminism offers valuable an approach to green problems progressively has become one of the main philosophical schools in environmentalist thought.

The idea lies behind the emergence of ecofeminism is that men considering the women and the nature equal sovereigned on the both and along with the sovereignty on women men started to reign either on the nature. These views were started to be expressed in the 1970s. The original argument of ecofeminism is the male influence and the patriarchal culture directing the male actions and the discourse of western white man in particular. (Ferry, 2000: 163). In this respect, the problematic of ecofeminist theory is based on that patriarchy dominates both women and nature, and considers them as secondary. Its main theme is, in short, the roots of ecological destruction lie beneath patriarchy; nature is threatened not by the human race, but by men and the institutions of men sovereignty. Feminists who have adopted a bi-sexual or sexless concept of human nature, suggest that patriarchy separates men from 'special worlds' and such separation spoiled their instincts and sensitivity.

Ecofeminists believe that their most important task is to transform the world created by male domination into another optimistic world. Mary Daly argued that if they allied themselves with women's nature, it would be
possible to get rid of patriarchal culture (Jin/Ekoloji-1979). Therefore ecological destruction and gender inequality, are parts of the same process where the men of ‘culture’ reigns over women of ‘nature’

In the first part of this study, the definition of ecofeminist will be given, their three main disagreement and what they advocate will be mentioned. In the second part, there will be criticisms about these three ecofeminist approaches. In the conclusion part, the solution proposal for the main goal that the ecofeminist stream wants to reach will be included.

The Concept of Ecofeminism and the Ecofeminist Approaches

The term ecofeminism was first mentioned by Françoise d’Eaubonne in his book Le Feminism ou la Mort (written in 1974). According to D;Eaubonne, factors causing environmental problems; are patriarchy, overpopulation and male controlled residual production of women commodified by men with the elimination of social gender and the ecological revolution under the leadership of women, the social order can be restored. Ecofeminism itself has differences of views. The first view in this regard is that women have different biological and psychological characteristics than men (Biehl, 1991:5-19). The second view is that closeness between women and nature is created by patriarchy in the course of historical and social process. The third view is establishing a bridge between the first and two opinions including outstanding feminist writers such as Mellor and Merchant adopting the argument that women's have different psychological and biological features as well as women-nature proximity has been created in course of the historical and social processes as basis. We will examine these approaches in more detail under different titles below.

The First Distinction in Ecofeminist Thought: Spirituality, Patriarchy and Women's Psychology

According to the ecofeminists who advocate this approach; women's features such as sacrifice, compassion, sentimentality, non-violence and production capacities and psychological characteristics are more dominant than men. Defenders of this school favour feminine values to be prioritized for the solution of ecological problems and they suggest to tend towards religious views that glorifies these values.

Collard identifies women's proximity to nature as ‘women's biological specificity’ and qualifies them as life-makers, breeders who carry new life and make it permanent. (Collard, 1988: 168). In evaluating their historical role in childbearing and raising children and because of the assumption that women are closer to nature than men it has turned into a respect for women (Bookchin, 1994: 25).

Patriarchy consubstantiated the woman with nature and took both under his patronage. The primary reason of today’s ecological crisis is that the patriarchal structure took women under the domination and that the patriarchal religions took place of the prehistoric religions praising the nature. In the past, in some societies, the goddesses of nature were believed. In that time when these societies existed, everything on the earth was equal and all were part of one totality.

In addition, feminine values of women such as care, compassion, and non-violence; was not pushed down to a secondary position by domineering male values inclining to violence and they were in the primary position women's bodies were glorified to be sacred. (Eisler, 1990:23-24). Today, in the beliefs of Abraham, which are patriarchal beliefs, people are created by an invisible God an they are above all other living things. Women and nature are dangerous and complex. According to these beliefs, men are given features to dominate and transform these dangerous and complex ones. (Spretnak, 1993:271-272). The Western Christian tradition is a dominant cultural system that causes poverty, leads to ecological crisis in the world, causing wars to emerge. (Reuther, 1992:2-12) In fact, Asian cultures can also oppose human-nature harmony in conformity with Western cultures. In order to solve the ecological problems raised by the Christian tradition, to worship Gaiya the Goddess of nature and earth could have been brought as a solution. In other words, instead of the dominant male God brought to the fore by the religions of Abraham, to worship Gaiya. (Heywood, 2016:310).
The Second Distinction in Ecofeminist Thought: The Effect of Social Processes

According to the ecofeminists who advocate this view, women do not have different psychological and biological features than men, in other words they are equal. They examine social events for the exploitation of women. First of all, they reject the goddess worship, which ecofeminists first advocate, because it ignore the rational and scientific understanding of nature and rely on the mystical understanding. According to them, women are not outside of ideologies and cultures furthermore to give women basic tasks such as feeding and childcare further reinforces and harms their gender patterns (Bigwood, 1993:134).

They advocate that nature and humanity cannot be free unless the class separation in society and hierarchy was terminated, racism, sexism, destruction of nature, wars, capitalism and the exploitation of countries by each other come to an end and individual freedoms are provided (Biehl, 1991:5). Women will not be free unless the thought structures of societies change.

If physical and cultural inequality is proposed between women and men the reason for this is to be sought in a non-natural social structure rather than a natural difference. (Akal, 2003: 272). Women should be freed from their biological destiny and technology should be used to achieve this goal.

Some feminists often base the origins of women's oppression on the thought of Enlightenment and benefit from Engels's ideas in their work. According to Engels, relations between men and women are equitable in primitive gathering societies. Women's oppression and exploitation has came to existence with the emergence of family, private property and the state, and then with the development of class society. (Engels, 1992: 54). According to the Marxist approach, the reason why the woman was crushed and traumatized is that the the matriarchal structures are replaced by patriarchal structures in other words the formation of organized institutions such as family, private property and the state and class societies. (Donovan 1997 aktaran İmançer, 2002:). according to Bookchin, with Kropotkin, the structure of the organic society was broken with the rise of the hierarchy and increase in the sovereignty of man over man. According to Kropotkin, the beginning of the hierarchy is the creation of families gathering individual wealth and power, and the transfer of that power from father to son (Kropotkin, 1955 by Mellor, 1992: 147).

The way of thinking here is that while prioritizing the superiority of reason and science, they question the negative consequences of enlightenment and criticize emerging social, cultural and political structures.

The Third Distinction in Ecofeminist Thought: The Relationship Between Psychological Differences and Social Processes

In the third approach by Mellor and Merchant; on the one hand, the biological and psychological characteristics of women more different from men are prevailed. On the other hand, they argue that social, cultural and political developments in the historical framework constitute the mentality of differentiating women from men. According to Mellor's approach, relations between men and women vary according to class, ethnic origin and culture. Women's work is a sine qua non for the progression of society and the existence of individuals, but the proposition that only women must do it is wrong. Event if it appears that making children and feeding them women is the primary task of women, this situation is not unchangeable fate. It is wrong to give them the meaning that they are altruistic, loving and compassionate by nature (Mellor, 1992: 251-254).

Behind the idea that women and nature are considered dangerous in Christian thought lies the fact that Eve taught Adam to sever a forbidden apple, and for that both of them were expelled from heaven and the reason for their expulsion from heaven was Eve, a woman. The fact that men forced to produce food and hunt for food in order to survive and struggle in the unknown, difficult earth was because of women. The real value of women and nature is bad. Men have to take control of these two bad (Merchant, 1996: 81). Men are the ones who turn the earth into heaven. According to Merchant, capitalism must be born to return to heaven (Merchant, 1996: 29).
Ecofeminists in the third distinction, suggesting the creation of common values that glorify women as a solution to ecological problems they seem closer to the ecofeminists in the first distinction. Those advocating this view argues that neither human centricism nor human interests are reduced to lowest level.

Critics for Ecofeminist Approach

Critics of the above-mentioned three distinctions of ecofeminists are as follows;

In the first distinction, which the exaltation of women due to their psychological and biological differences and named as mother nature, the fact that women are naturally adopted to these qualities reinforces their gender role. In addition, the fact that no mather in which category women are considered in one of these three distinctions, they are interpreted as a single category, in other words to ignore their other distinctions such ethnic origin, social class is a second point of criticism. Along with the difficulties women face due to their biological sex for example, black women, are to be taken under control by white men or women (does not matter which of them) because of their race, is an important point mostly forgotten (Taylor, 1997: 63).

To make a definition about the irrevocable aspects of women, When viewed from the historical perspective from the past to the present, excludes also its cultural and time differences. In addition, the position of women in developing countries and those in developing and underdeveloped countries is different. Underdeveloped countries are developing with the development projects of Western countries. In other words they are under the protection and patronage of Western countries It is observed that the social status of women living in rural areas and cities in underdeveloped or developing countries change according to their habitats.

In short, the second and third distinctions in Western ecofeminism claim that the proximity of women-nature is shaped by patriarchy within the historical and social framework. While the ecofeminists in the second distinction do not accept that men and women have different biological and psychological characteristics, in other words they consider them equal. The ecofeminists in the third distinction, accept the differences, suggesting that they are the basis of female-nature proximity. As the ecofeminists of the second distinction argue that the social and economic system must change completely for the emancipation of women and nature, Ecofeminists in the third distinction which have a closer view to ecofeminists in the first distinction, present developing the new ‘partnership ethics’, which elevates feminine values as solution to environmental problems. Western ecofeminism is criticized for considering women as a single category and for ignoring class and racial differences in experiencing patriarchal domination.

Conclusion

In the ecofeminist approach, since nature is considered to be a very broad and variable category and also exposed to many different types of colonization, an appropriate assessment of the domination on nature, must also be based on the analysis of other forms of oppression-domination. In the light of this view, ecofeminism should be a movement aiming to change other forms of social oppression such as other gender discrimination, racism as well as domination of women; refusing the domination of nature; covering all kinds of life, ie plants, animals and all the earth. In other words, ecofeminism must reject all kinds of domination. The approaches appropriate to the cultural and social movements of every society should not be ignored. The ideological, cultural and economic structures of societies need to be reorganized and transformed in a large and effective manner in order to solve the problems of women and to prevent the environmental destruction and to solve its problems.
References


Video Surveillance and Law: Uses and Challenges

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Abstract

Internet of Things has found its applications in almost all aspects of life. As per Gartner, there will be 20 billion connected devices by 2020. Internet of Things is being used in industrial sector, agriculture sector, transportation sector, health care and education sector. It has made smart homes and smart cities a possibility. Internet of Things has revolutionized the field of law particularly. Law Enforcement uses multiple wearables, different surveillance techniques and applications to prevent crime, investigate crimes and for forensic intelligence. Internet of Things setup has been successfully implemented in court systems making them more efficient. Among the surveillance techniques, one that is used most frequently is video surveillance. Video surveillance has evolved from the being closed ‘CCTV’ to a live system after its integration with Internet of Things. Video surveillance is carried out not only by open-street cameras but also by utilizing body worn cameras, in-car video systems, drones and license plate readers. Footage obtained by video surveillance is used as evidence in the court of law. Video Surveillance has helped solve multiple high profile cases like 2005 London Bombings, 2013 Boston Marathon Bombing and recently rape and brutal murder of six-year old girl Alesha MacPhail in July 2018 in UK. However, video surveillance is not without its drawbacks. Issues like privacy, data retention, quality of video, energy efficiency and others are associated with it. Authorities have passed different policies in order to regulate the video surveillance setup. In the never-ending debate of security vs privacy, every state in United States has different policy but most policies tilt more towards the security while European Union adheres more to the concept of privacy.

Keywords: Internet of Things, Video Surveillance, Video Surveillance Policy, Law

Introduction

Internet of things allude to the precise link between the physical and digital world (Ray and Pratim, 2018, p.p. 291-319). As per ITU, Internet of things is defined as follows: “A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.(ITU , 2019)

IoT market is expected to rise to $11.1 trillion by 2025 with 212 billion connected things by 2020 (Al-Fuqaha and Others, 2015, p.p. 2347-2376). Google trends suggest that interest in ‘internet of things’ and ‘smart things’ have been gradually increasing risen particularly in the last decade as depicted in the following graph.
Internet of Things is being used increasingly in sectors such as Automobile Industry, Manufacturing, Agriculture, Healthcare, Hospitality, Retail, Finance, Transportation, Energy/Utilities Industry, Smart homes and buildings and Law Enforcement. In this paper, we will focus on the use of Internet of Things in the field of Law whether it is Law Enforcement Departments or whether it is the judicial system. One of the most widely used IoT setup currently in the field of law is the ‘Video Surveillance System’. It is mainly used for reconstruction and interpretation of criminal events, identification of persons depicted in the images, provide forensic intelligence to an investigation and provide physical evidence (Al-Fuqaha and Others, 2015, p.p. 2347-2376).

First part of the paper details the application of Internet of things in various fields. Second part focuses on the use of Internet of Things in the field of law. Third part is about the introduction of video surveillance in different countries and its applications in law. Fourth lists the legal and technical challenges in the current Video Surveillance Setup. In fifth part, current policies and guidelines pertaining to video surveillance are discussed.

**Internet of Things and its Applications:**

Internet of things is covering every aspect of lives of the people especially the ones living in the developed countries. It has found its application from one’s home to one’s place of work, from one’s social life to one’s healthcare, from shopping to manufacturing, from agriculture to industries, from hospitality to finance, from entertainment to law.

The highest potential that IoT is predicted to have is in the deployment of ‘smart homes’ or refurbishing the current ones into smart homes (Mashal and Shuhaiber, 2018). In a smart home, home is furnished with sensors and smart appliances, which are connected through Internet. This cyber physical system assists in daily chores but also ensures safety of home and its occupants (Shuhaiber and Mashal, 2019). This new setup will particularly provide ease and support to the elderly, people in need of special care, and patients suffering from chronic diseases whether are inside or outside the house (Redeer and Others, 2013, p.p 565-579). Energy usage can also be monitored and controlled by use of smart systems in a home which will eventually help against emerging threats like climate change (Chen and Others, 2017, p.p.27-33). Monitoring the use of electricity can help compare tariffs if multiple electricity providing companies are present in the vicinity (Marikyan, Papagiannidis and Alamanos, 2019, p.p. 139-154). A research also indicates that smart home can help lonely people fraternize (Chan and Others, 2008, p.p. 55-81)

Similarly, we have a concept of smart city. A smart city can be defined as “an ecosystem or, more precisely, as a Cyber-Physical Social System including sensors, actuators, devices, related data and information, applications and services, as well as policies, rules, laws, and citizens” (Bruneo and Others, 2019, p.p. 12-33). In a smart city like Amsterdam, the Internet of Things, mobile internet, smartphones, and other socio-technical innovations are interconnected. This not only facilitates the citizens but also help in solving the problems by engaging the people of the smart city (Anand and Navio-Marco, 2018). Smart cities can also help entrepreneurs resulting in betterment of economic state of the city. Like London has four particular goals for its smart city project: a) technology innovation; b) open data and transparency; c) collaboration and engagement; d) efficiency and resource management (Appio, Lima and Paroutis, 2018).
As the population of the world increases, so does the demand for food. People not only want more quantity but also high quality when it comes to food. As IoT becomes more and more common, multiple researches are being done to facilitate and enhance the field of agriculture using IoT products. The use of IoT products not only helps in facilitating the stakeholders in agriculture but also helps in providing lots of data, which can be further analyzed to improve the product as well as increasing the agriculture yield (Tzounis and Others, 2017, p.p. 31-48). The concept of ‘Smart Farming has also emerged. It is a system laced with latest technologies to grow food cleanly and increase the yield. Even though huge investment is required for such a setup, the use of IoT will enable the agriculture stakeholders in enhancing productivity, minimize waste and provide data regarding amount of fertilizer used, miles covered by the farm vehicles, etc, through smart monitoring (Mat and Others, 2018, p.p. 54-59).

One of the earliest applications that Internet of Things found was in the Industrial sector. It gave the stakeholders better control and awareness about the operations and maintenance routines of the industry. The efficiency provided by Internet of Things improved the workflow and increased profits and revenue by reducing the operations and maintenance cost. The data collected from the machines is used for predicting time schedules for maintenance; thus saving the machine by repairing the machine timely. These benefits are being reaped by Thames Water. Thames Water is the largest provider of fresh water for drinking purposes as well as water waste recycler in the UK. It uses IoT for managing their assets remotely and predictive maintenance. Similarly, Schulumburger found uses of IoT in autonomous underwater vehicles which are used to survey and inspect subsea conditions. Industrial robots are also becoming common used particularly for dangerous or heavy lifting tasks (Gilchrist, 2016). Another feature that is attractive to the industrial stakeholders when it comes to IoT is ease of access to the data pertaining to processes and machines in the industry. No special terminal is required for viewing the said data instead a common smartphone or a tablet can be utilized for this purpose (Wollschaenger, Sauter and Jasperneite, 2017, p.p. 17-27).

Another field that Internet of Things has revolutionized is the field of health care. The modern health care has been restructured as the applications for remote health monitoring, fitness programs, chronic diseases and elderly care have been introduced. Health care professionals can also check if the patient is taking the prescribed medicine on time. The potential gains by using IoT based health care are reducing costs and enhancing quality of life. The patient’s experience can also be improved by viewing data and response. The primary use of IoT in health care can be divided into two main parts; services like Ambient Assisted Living, Adverse Drug Reaction, Community Health Care, Semantic Medical Access, Indirect Emergency Healthcare, etc; and applications like Glucose level sensing, Electrocardiogram monitoring, Blood pressure and body temperature monitoring, medication management, would analysis, remote surgery, etc (Islam and Others, 2015, p.p. 678-708). The use of IoT in pharmaceutical sector is also being explored. Medical products and related care processes are being digitized using smart medical devices. This helps in drug development, clinical trials and patient care. The data obtained by Pharma IoT can help the professionals devise new kinds of ways to treat diseases (Dimitrov, 2016, p.p 156-163).

The experience of education can also be enhanced using Internet of Things. It will significantly improve communication between students, teachers and parents of students with each having access to the relevant information pertaining to education. Students can connect with teachers and utilize other educational tools provided by their school, college or university. The parents can also view the data relating to the progress of their children. Schools, though a haven of knowledge, can turn out to be a risky place. With IoT, proper and efficient security system can be installed. Lockdown systems can be initiated with just a touch on the application provided to teachers on their cellphones or tablets in case of emergency. Multiple students can be saved in case of school shootings like Santa Fe School Shooting in Texas in May 2018 which resulted in death of 10 people or in case of a terrorist attack like Peshawar Army Public School which resulted in death of 149 people, 132 of which were students in December, 2014. The system can also be devised to send SOS to the law-enforcement agency, fire stations and hospitals. Basic functions like attendance, fee submission and reports can be automated easily. The special needs children can benefit from this technological development, too. (Prasanna, 2018, p 128). Internet of Things can facilitate teachers in designing course outlines, improve efficiency of their teaching methods and help students (Zheng and Others, 2016). Concept of seamless learning has also emerged with the advancement of

Transportation Sector is also exploiting Internet of Things. Several applications for transportation vehicles have been introduced which cover the whole vehicle to even things like parking, fuel consumption and more. Electric vehicles have been introduced which help in fighting against climate change as well as eliminating the use of fossil fuels. With smart applications, traffic can be reduced on the roads (Speranza, 2018, p.p. 830-836). The smart-roads could manage traffic congestion more efficiently. Implementing smart transportation system is estimated to reduce the money spent to handle congestion by 15%. Parking guidance would help drivers to find empty parking slots rather than roaming in the whole area looking for one. Special alerts about school zone or pedestrian zone can also be part of the system (Sherly and Somasundareswari, 2015, p.p. 1207-1210). Similarly, trains can be equipped with sensors to detect if tracks are clear or not (Jain and Others, 2018, p.p. 707-714).

It is also used to monitor the environment and what factors affect it. It is based on scientific observations of changes occurring in our environment by utilizing IoT sensors and technology. Data regarding natural cycles and anthropogenic-based impacts is collected and analyzed. For instance, like monitoring the causes of pollution in the environment and their effects (Brusseau, Pepper and Gebra, 2019). IoT can be used to monitor and collect data pertaining to extreme weather, wind speed, temperature and humidity (Patel and Patel, 2016). It can be used to develop flood prevention systems and provide alters to the residents of the area in case of flash flood (Salunke and Korade, 2017). Internet of Things is being used to determine air quality and amount of gases in the atmosphere (Xiaojun, Xiangpeng and Peng, 2015, p.p.257-260). It is also employed to observe ecological indicators in terrestrial and aquatic ecosystems (Linder, Horne and Ward, 2017, p.p. 178-191). Smart Grid has also become quite well known for its monitoring of energy usage and management. IoT is also being in Wind Turbines and Power Houses to analyze the flow of energy. Smart meters are used to observe energy consumption patterns. It is also facilitating in monitoring and optimizing the performance of solar panels. Iot has been found to be an effective tool to increase energy efficiency (Patel and Patel, 2016). There are multiple other fields deploying IoT for better monitoring and ease of control. Internet of Things has also found its application in the field of law whether it is surveillance or wearables.

**Internet of Things and Its Applications in Law:**

“IoE lets police officers send and receive real-time video data from the field, greatly improving situational awareness.”- Chief Bob Stanberry (retired) (Cisco, 2014)

Advancement of technology has also modified the law enforcement agencies and court justice system. The progress in ICT technologies, analytic systems, surveillance systems, license plate readers, DNA testing has forever changed the dynamics of policing. Technology acquisition has vastly improved the efficiency of law enforcement agencies (Koper and Others, 2016). These game changing technologies include information and communications technologies like IT systems, information analysis systems and tools, and facility operations and population services like provision of security by using IoT devices and sensors. Unmanned vehicles have also found their use in the police departments along with the multiple wearables (Hollywood and Others, 2017).

Technology has enhanced the crime control abilities of the police force for example by enabling them to monitor repeat offenders. Data gathered by surveillance helps in pointing out areas and conditions with higher crime rate. It also vastly improves the response time of the police force. Evidence collection has significantly improved. The devices also help in implementing different police strategies where the police officers are connected to the central command on real-time basis. The communication between police and public has also become more efficient. Innovations improving the protective gears and weapons along with surveillance systems give better awareness and control of situation, which in turn can result in saving life of suspects, bystanders as well as police officers. Crime analysis has improved due to information technology and database integration. These new advancements not only help deter crime and help in investigation but also monitors the police actions (Koper and Others, 2016). The police are effectively using biometrics, digital imaging and monitoring. Through video surveillance, not only facial recognition is being done but also action and expression recognition are being carried out. Locations can be traced in way, too (Nunn, 2001, pp. 11-27). Big Data and machine learning can
also be effectively used to create strategy for real-time responses for crime. Nowadays even crime forecasting
is being done using Big Data like the IBM ‘i2 COPLINK’. Criminals are identified by real-time video monitoring
like the ‘Domain Awareness System’ created by Microsoft in collaboration with New York Police Department.
NYPD is also using smart cars equipped with cameras and sensors. Even portable DNA testing machines
connected with live database are being used (Moon and Others, 2017, p. 1921).

It was suggested by the police that young offenders would be issued tags that block internet connections,
rendering the youth unable to use internet as punishment (Usborne, 2017). Law enforcements forces all over the
world are using Body Worn Cameras. It minimizes the use of deadly force like multiple cases in USA. The
presence of BWV camera can help increase trust of the public and record evidence. This has been done in a trial
conducted in USA where all footage was recorded and presented in court with the exception of minors who were
sexually assaulted and police informants. The footage from BWV cameras can be streamed live allowing experts
to point out important aspects and evidence from the crime scene. They are word by officers during raid in
dangerous locations where experts can point out any device or container that can be potentially hazardous to the
officers. The Dutch Police already use this and have found these cameras as important tools that also help in
solving crime. The Dutch Police made multiple teams watch the live stream from the crime scene, which also
enhanced information sharing (Rogers and Scally, 2018, p.p. 100-110). The Queensland police attached mobile
radar technology to the police motorbikes. These new radars check speed of the vehicles in the traffic even when
bike is moving. Sergeant Sean Whittet mentioned that he issued 15 tickets, which was rare in one day on
Warrego Highway while discussing the efficiency of the new radar system (Withey, 2014).

North Lincolnshores’s police officers are equipped with PDA (Personal Digital Systems) that are used to
communicate with the public due to introduction of on-the-go email systems. These PDAs also work as phone,
diary and can be used to browse internet with the exception of websites like Facebook and Twitter. Sergeant
James Main lists multiple benefits of this system like ease of communication with public, faster response time as
e-mail is received directly by the officer patrolling and access to information (Scunthorpe Evening Telegraph,
2007). Police Forces around the world are also using UAVs to monitor public spaces, protests and other large
gatherings (Saulnier and Thompson, 2016, p.p 680-693).

Thermographic imagery taken by using infrared radar which allows one to distinguish objects due to difference
in their heat signatures have also become a common place for police. They are used for thermal imaging when
video surveillance cannot be used. US police used it effectively to catch people having methamphetamine labs or
growing marijuana due to high heat signatures from the suspected buildings. They are also used to locate hidden
compartment or to find location of hidden gravesites (Nunn, 2003, p.p. 454-472). BAN (Body Area Network) is
a field of Internet of things pertaining to the human body (Wang, 2017, p.p. 129-139). Gait pattern is one of the
biometrics and everybody has specific gait patterns. Forensics technologies have been developed to recognize people via their gait as measured by using location of ankle, knee and hip. CIA to identify people of interest
used Fitbit data (Bouchrika and Others, 2011, p.p. 882-889).

Another innovation deployed for virtual surveillance is the robotic device. Police, for perimeter patrolling, use
these devices. They are also used to neutralize explosives. Suspicious baggage is examined using these devices.
They are also used for intelligent video surveillance (Wang, 2017, p.p. 129-139). Where people find direct video
surveillance intruding, advanced exterior sensor system, which uses thermal infrared imaging, light imaging and
microwave radar has been developed. It can be easily installed in parks, city centers and airport runways to
provide full scan of the places (Ling, Li and Wang, 2012). Another less intrusive surveillance technology used
by police force is acoustic surveillance. Acoustic sensors are placed at a certain distance in a big area. In real-
time input from these sensors in analyzed and in case of detection of sound like gunfire, police are alerted

New wearable technologies are greatly advantageous to the police officers. They have more functions with
enhanced performance and at the same time having convenient sizes unlike the equipment used by police in the
past. Health and Safety technologies in the wearable convenient sizes are greatly helpful in the field decreasing
the risk to the life of police officer and fast provision of emergency health care if required (Silberglitt and
Others, 2017). Special vests have been developed for police with electrically conducive yarns and threads giving
them electronic functionality. They could transfer data as well as monitor body functions (Tyler, 2016). Smart clothing is capable of sensing the environmental factors (Lazaroiu, 2012, p.p 162-167). Biometric sensors installed in the smart vests would be heart rate sensor, blood pressure measurement, oxygenation levels, drug and alcohol monitors, etc (Silberglied, 2017).

Augmented Reality is a field of technology that enhances users’ awareness of the area around them. It will enable police to know about potential weapons in a large gathering in one scan. Combined with Facial Recognition, it could also identify the person carrying the said weapon. AR systems could be used for training the police officers for crisis or active shooter situations. This system can be integrated with glasses or headsets (Navarro, 2016, P.p. 12-18). ‘Smart Glasses’ with camera and artificial intelligence are already being used by Dubai Police. They automatically scan faces of people and if person of interest is found, an alert would be sent to the concerning law enforcement agency (Tesorero, 2017). It is also being used by Chinese police who arrested seven fugitives and twenty-six people traveling with fake ID at Zhengzhou train station in China (Baraniuk, 2018). These glasses are also used by Chinese police to license plates of vehicles (Business World, 2018).

Smart weapons, with multiple sensors and connected to internet, are gaining market, too. They have found their application not only in the military but also in law enforcement departments. The market for smart missile and bombs, smart sensors and smart munitions is expected to garner lot of attention particularly by US, China and Russia (M2 Presswire, 2017). Use of smart weapons can minimize collateral damage as they hit their target without missing (M2 Presswire, 2014). Gun safety advocates in US, especially support smart guns. In 2016, Obama administration announced that state and local law enforcement agencies would be awarded funds to procure smart guns when they become available. They were also asked to collaborate with manufacturers to consult on the specifications of the smart guns (Breitenbach, 2016). The smart weapons market is forecast to reach a value of USD 15.64 billion by 2021 (PR Newswire, 2016).

Internet of Things is not only being used to facilitate and increase safety of police officers but also the thousands of dogs that work for the law enforcement agencies. US Homeland Security is equipping it K-9 units with harness that has sensors to monitor dogs’ heart rate and other vitals. The said harness would also have a GPS tracker. Moreover, it will also have sensors to monitor environmental aspects like air temperature and humidity (Russey, 2019). Police dogs, too, lead a very active life. They track down criminals. They are trained to sniff out explosives and drugs. Different types of pet wearables exist in market today for police dogs, which have features like GPS trackers, activity trackers and health monitoring. Activity trackers can be extremely useful for retracing the steps of dogs when dogs are used for searching missing persons or suspected persons (May, 2015).

Police and public safety officials also use smart watches. They install multiple applications that helps them in their tasks. Applications like US Cop brings relevant information like investigation reports, law resources, drug or chemical identifiers on the fingertips of street police and patrol officers. Similarly, Crime Scene tracker applications enables the user to add location, hints and clues from the crime scene. Police also use applications like First Aid developed by Red Cross, which contains systematic guide with illustrations for giving first aid (Cyber Security Intelligence, 2017).

Court systems, too, employ Internet of Things. IoT brings efficiency to the court system when superior analytics and better and organized evidence is brought in court. Technology ensures speedy proceedings along with reducing costs and improving satisfactions. IoT can also automate forming an LLC. If IoT is combined with new regulations, it can reduce workload of lawyers by removing common legal tasks from their list to do. This would not only reduce operations cost but also speed up processes which usually require months of legal and bureaucratic procedures (TutorialsPoint, 2019). Justice system utilizing IoE can also provide face-to-face collaboration in the courts without the need to move inmates. Multiple costs can be reduced. Remote adjudication and remote testimonies become possible. Delays can be eliminated. One such example is of Dallas County Public Defender. Dallas County office has 94 public defenders who try more than 45000 cases per year. The county took advantage of IoE’s potential by installing a robust IP network backbone capable of supporting video applications and deploying 200 video endpoints for remote court appearances and other types of video in remote locations. The system is used to arraign prisoners in the jail and communicate with the Justice of the Peace Courts and the Dallas County Community Supervision and Corrections Department.
“Once you have the infrastructure in place, you can use it for myriad applications, such as arraignment, testimony, or interpretation services.” Judge Boyd Patterson (retired) Dallas County Chief Magistrate (Cisco, 2014).

**Video Surveillance System and Its Applications in Law:**

“The first thing you do now if there’s an incident, a murder or a rape, you seize all the CCTV you can get”. (Levesley, Martin and Britain, 2005)

Covert and overt surveillance has become a norm in the current society. Law enforcement agencies immediately started using the surveillance systems. Surveillance images and videos are being used primarily for: (Porter, 2011)

i. The reconstruction and interpretation of events and/or criminal activity.

ii. Identification of persons depicted in the images.

iii. Determination of whether an offence has been committed.

iv. Provision of forensic intelligence to an investigation.

v. Provision of physical evidence for prosecution

Commander Simon Foy, Scotland Yard’s head of homicide, told the Daily Telegraph that video from surveillance cameras are as important as DNA evidence as it plays a crucial role in investigation (Richards, 2009). Video Surveillance has now evolved from the closed circuit CCTV to an open system where surveillance videos can be viewed by the officers on their phones and tablets.

In Denmark, use of CCTV can be traced back to 1954. It consisted of two parts, a camera and a control box that was connected to TV monitor. They were first installed by industries in Denmark to monitor procedures in inaccessible or dangerous places. Prime example of that is the use of CCTV in an incineration plant to monitor the flames in the incinerator. Similarly, in 1954 US used the CCTV in the production sites (Lauritsen and Feuerbach, 2015, p.p. 528-538). In UK, CCTV cameras were first installed on the roads of Durham, England to manage traffic. Police for law enforcement purposes quickly adapted them. By 1969, multiple different police forces were using CCTV technology in England. In next decade, instead of government, local retail sector started using video surveillance technology. In the 1990s, CCTV technology expanded at a faster rate due to decrease in the cost of technology and government and police’s agenda to prevent crimes. Moreover, no regulations existed to hinder the increase in the video surveillance. The image of two-year-old James Bulger with his killers, right before his murder proved to be a powerful factor in acceptance of CCTV by public and expansion of open-street CCTV setup by government which was controlled by local authority (Norris, 2010, p.p. 421-450).

Similarly, in New York State Assemblymen Doy Hikind and Peter Abbate along with Senator Diane Savino introduced a bill called “Leiby’s Initiative” after the murder of 8-year-old boy named Leiby Kletzky in July 2011, whose killer was caught by the help of CCTV footage. This initiative gave tax credit equal to $500 to any resident of New York City who installed and maintained video surveillance system on their properties (CBS New York, 2011). 100 security cameras were installed in New York areas of Midwood and Borough Park against Leiby Kletzky Security Initiative. New York Police Department were provided access to the video only (Ellier, 2014). Australia joined the countries with open-street CCTV systems in 1991. They were first installed in Perth and gradually expanded (Wilson and Sutton, 2003, p.p. 200102-26). Developing country like Pakistan also installed open-street video surveillance in its capital city, Islamabad. The project was named Safe City Project. It started in 2015 and was completed in 2016. This project was done in collaboration of three government organizations namely Islamabad Police, National Database and Registration Authority (NADRA) and National Telecommunication Corporation (NTC). This project was then extended to city of Lahore and is currently in process. In future, similar systems would be installed in other major cities of Pakistan like Karachi, Quetta and Peshawar.
Video surveillance has helped solve multiple cases like the 13-day bombing campaign carried out by David Copeland in London. These bombings killed three people while injuring 139 (Cash, 2009). Investigations of other high profile cases, like 2004 Madrid Train Bombings which resulted in death of 193 people while around 200 were injured and 2005 London Bombings in which 52 people were killed and more than 700 were injured, were greatly facilitated by the video surveillance present in and around the crime scenes. Surveillance videos also played in integral role in identifying and capturing the suspects of Boston Marathon bombing in April 2015. Three people lost their lives and several hundred were injured when two homemade pressure cooker bombs detonated (CNN, 2013). Law enforcement agencies collected CCTV footage from over 200 businesses and even the images taken by crowd. In 24 hours, police and relevant authorities were able to compile 10 terabytes of video surveillance data (Montgomery, Horiwitz and Fisher, 2013).

The importance of video surveillance in the reconstruction and interpretation of events was evident in the recent investigation by Scotland Police in the case of rape and brutal murder of a six-year-old girl named Alesha MacPhail in July 2018. The killer, a sixteen-year-old boy, was caught after his own mother called the police after viewing the CCTV footage of the cameras outside her house. The boy was found coming and going outside late at night between the time window, during which the said crimes against the little girl had been committed (BBC, 2019). Similarly, Detective Chef Inspector Bruce Riddel of Oxford released CCTV images of a man who could hold vital information pertaining to the case of sexual assault on a woman in Oxford in February 2019 (BBC, 2019). Likewise, Police are examining the video surveillance footage of 240,000 hours of Muckamore Abbey Hospital to investigate the complaint of alleged abuse of vulnerable patients there (BBC, 2019). BBC claimed that the said footage showed physical as well as verbal abuse directed at patients by the nursing staff (BBC, 2019). Video Surveillance played an instrumental role in the investigation of rape and murder case of Zainab Ansari, a six-year-old Pakistani girl. (Rehman, 2018).

The use of Automatic Number Plate Recognition or commonly known as License Plate Reader technology is growing day by day. For example, in UK all major roads and highways have these systems installed. It has been quite successful since its inception with detection of over 11 billion illegal vehicles. This system has also been used to provide intelligence when used to monitor high-risk offenders, sexual exploitation groups and organized crime groups. It also aids in major investigations. Dyfed Powys Police use ANPR applications via their mobile phones to review data in real time. (Rogers and Scally, 2018).

Law enforcement agencies are also using unmanned aerial vehicle (UAV), commonly known as drones. They are not only being used by police but also by emergency and fire rescues as well as for environmental protection (Jones, 2014). The primary application of drones in the police force is video surveillance. Drones are also being used for searching missing people and responding to accidents. Durham Constabulary in United Kingdom has used UAV to search for missing persons. USA Police has employed drones to gain situational awareness during arrest. They are also used in search and rescue operations. They have been used to support district policing by the Police Service of Northern Ireland (Hiltner, 2013, p.397). Law enforcement agencies use drones to map crowded locations like malls and schools. Ortho-mosaic Maps can be created using this data and used for operations in case of emergency. UAVs can be used for surveying disaster sites. Authorities used drones to assess the damage done by Hurricane Harvey in Houston. The drones were used to look for people trapped in their homes and in identifying the areas where first aid or other resources were required. Drones are also used for investigating bomb threats (Dukowitz, 2018).

Police officers use in-car video systems to record encounters. These cameras are installed in patrol vehicles. The video obtained by ICV systems can be used to hold police officers accountable. It can decrease unprofessional unlawful behavior by police officers like use of excess force, racial profiling, etc. In turn, ICV systems can also protect police officers against false allegations. The video from ICV systems can also be used as evidence (Koperand Others, 2015). Example of this case is a an incident where video was captured by ICV system in which 17 year old Laquan McDonald was killed by Chicago Police Officer Jason Van Dyke. The incident was painted as McDonald attacked the officer and the said officer acted in self-defense. However, the dash-cam video was quick to bring down the house of cards created by Chicago Police Department (Shoichet, 2015).
Body-worn cameras have already been discussed in previous section. Police Officers wearing body-worn cameras are more proactive than the ones not wearing it (Hollywood and Others, 2017). Research has found that body worn cameras result in decrease of 50% use-of-force incidents. Similarly, a University of Cambridge study found a 93 percent decrease in complaints against the police after officers began wearing cameras (Ariel and Others, 2017, p.p. 293-316).

Images from the video surveillance are also used for evidence (Porter, 2009, p.p. 11-25). In almost every case nowadays, images and videos from video surveillance systems are used by law enforcement agencies to prosecute a criminal. Multiple researches are being done to improve facial recognition from usually poor images and videos obtained from the surveillance cameras (Seckiner and Others, 2018, p.p. 77-85).

Challenges - Video Surveillance Setup

i. Privacy:
“Surveillance and privacy are mutually exclusive: if one increases, the other decreases.” (Smelser and Blates, 2001)

Privacy is considered a moral and a legal right. It can be described as right to be left alone. The multitude of surveillance techniques employed by Government like big data analysis of personal information, phone call logs, Internet of Things for counter-terrorism, exploitation of geospatial information and biometrics, etc could be hard for the citizens of a country to accept. At the same time, it would be hard for government to justify. As the technology advances, in the era of Internet of things the line between public and private information is hard to distinguish (Mam, 2018, p.p. 56-67). Governments and regimes have been conducting surveillance for a long time. Before the video surveillance systems and Internet of Things, government agencies used to intercept radio communications. As technology advanced, the method of surveillance enhanced long with it (Mamonov and Koufaris, 2016, p.p. 56-67). Americans unlike the Europeans are not much concerned about privacy but even they felt exposed after Snowden revelations (Greenwald, 2014).

The most common arguments against protection of privacy is the ‘I’ve got nothing to hide’ rationale. Eric Schmidt when he was CEO of google said, “If you have something that you don’t want anyone to know, maybe you shouldn’t be doing it in the first place.” Similarly, Mark Zuckerberg from Facebook said, “By giving people the power to share, we’re making the world more transparent. The question is not ‘What do we want to know about people?’ but rather “What do people want to tell about themselves?” In short, to people who don’t care about personal privacy, privacy is outdated concept and is not required if you are not doing anything unethical or illegal.

The above arguments are based on assumptions that privacy s only required to hide unlawful conduct. Privacy lawyer Daniel Solove contended this and said that when balancing security and privacy, the privacy gets the short end of the stick while security interests are exaggerated. Edward Snowden replied against this argument by saying, “‘Arguing that you don’t care about the right to privacy because you have nothing to hide is no different than saying you don’t care about free speech because you have nothing to say.’” (Santanen, 2019, p.p. 5-14)

Several researches have been carried out to deal with the privacy concern issues. Among the techniques developed the ones utilized most are scrambling and data hiding methods, cryptographic encryption and access control policy. The scrambling and data hiding approaches usually first identify the regions of interest in video data that are potentially privacy-sensitive, and scramble that region to minimize the chance of privacy leakage. The cryptographic encryption approach, among other things, hides privacy information of video using watermark, while the access control strategy restricts the access of surveillance feeds to authorized users only (Rahman and Others, 2016, p.p. 344-352).

ii. Image Quality:
The quality of the recording may often be so poor as to render the ‘evidence’ as worthless for the purpose of identification. - (Bromby, 2003, p302)
A good quality video from surveillance system can help the police in investigations (Agustina and Clavell, 2011, p.p 168-174). One of the most substantial problem that arise when video from surveillance systems are used as forensic evidence is the quality of the video. The video quality effects the outcome of the case. For example in a case in Australia Regina vs Jung NSWSC, the sole evidence with the prosecution was a poor quality video from surveillance cameras and ATM machine. It was a case of double murder. Similarly, poor quality video surveillance was also presented in other cases like Atkins & Atkins -v- The Queen EWCA (2009) (UK). It has become a norm to present surveillance footage as evidence and such evidence should not be taken lightly. Misinterpretation of video due to bad quality can result in serious injustice (Porter, 2011).

The case of Rodney King Video evidence is a clear example of how videos can be misinterpreted. The video evidence in general suggested that excessive force was used against Rodney King causing him distress and putting him in a precarious situation. However, the analysis of video as per prosecution revealed that Rodney King was not feeling distressed at all. The opinion is still divided. (Feigenson and Spielsel, 2018, p.173)

In February 2019, police searching for Hull student named Libby Squire, released a ‘grainy’ video from the nearby surveillance camera. Libby Squire is a 21-yr-old girl from Buckinghamshire who went missing. The quality of video is quite bad and the only thing that can be discerned that one of the four people could be potential witness or might have some information about Libby Squire (BBC, 2019).

Video evidence is often considered foolproof. There are different types of video surveillance cameras and image quality is not consistent. Poor quality images can be problematic from the perspective of both the defense and prosecution. From prosecution’s perspective, a poor quality video may not be able to clearly show the culprit which can be used by defense to create reasonable doubt. (Nedum, 2014).

iii. Energy Efficiency:

It might seem strange that one of the challenges in regards to video surveillance system is global warming. However, as video surveillance has been integrated with Internet of Things, there is proper technology chain from camera to cloud.

As was underlined during the last United Nations climate change conference (Conference of the Parties, COP 24), global warming is a major concern for humanity. The goal defined during the Paris Agreement of 2015 was to keep the increase in global average temperature to well below 2°C above pre-industrial levels. This goal might be reached by bringing greenhouse gas emissions to zero within the second half of the 21st century. Such an effort presupposes a profound change to our way of life and energetic application of transitional policies to reduce dependence on fossil fuels (Associated Press, 2016).

The demand for cloud computing and edge computing will rise exponentially after the integration of Internet of things (Orgerie, Assuncao and Lefevre, 2014, p. 47). A study conducted in 2012 indicated that data centers world-wide were consuming electricity around 30 nuclear power plants (Glanz, 2012) and another research in 2016 estimated that data centers were using 91 billion kilowatt-hours of electricity (Lux Research, 2016). And this will only increase as new Data Centers would be established along eth multiple small data centers for edge computing. There is no doubt that ecological impact can be associated with it (Orgerie, Assuncao and Lefevre, 2014, p.47).

Video data unlike other forms of data is bulky and higher the quality of video, more energy is consumed in its transfer and processing (Li and Others, 2017, p.p. 186-195). Energy Efficiency directive and Energy Efficiency First are two directives passed by European Union to impart the importance of energy efficiency.

As per Directive 2012/27/EU, “The Union is facing unprecedented challenges resulting from increased dependence on energy imports and scarce energy resources, and the need to limit climate change and to overcome the economic crisis. Energy efficiency is a valuable means to address these challenges. It improves the Union’s security of supply by reducing primary energy consumption and decreasing energy imports. It helps to reduce greenhouse gas emissions in a cost-effective way and thereby to mitigate climate change. Shifting to a more energy-efficient economy should also accelerate the spread of innovative technological solutions and
improve the competitiveness of industry in the Union, boosting economic growth and creating high quality jobs in several sectors related to energy efficiency” (EED, 2012). Energy Efficiency First extends the targets of the Energy Efficiency Directive to 2030. (EEF, 2018)

iv. Freedom of Expression and Discrimination:
The video surveillance may restrict the right of individuals to freely express themselves. Like during the Vietnam War, people participating in anti-war protests claimed that surveillance done by Army greatly hindered their right to freely demonstrate their views (Larid vs Tatum, 1972). Sometimes, video surveillance trends reflect discriminatory behavior. Welsh and Farrington (2002) found that ‘black people’ were observed more via surveillance in UK, despite their low ratio in the population.

v. Data Retention:
Authorities can retain video surveillance data for a long period. This creates a risk for the data to be breached. Moreover, video data, unlike other forms of data, has bigger size and large amount of storage capacity is required to retain it. This puts burden on the establishment as well as cloud. Data should be retained only in special cases pertaining to serious crimes like investigating serial killers or matters pertaining to national security.

Regulations, Policies and Guidelines for Video Surveillance:
In the beginning, when the video surveillance was introduced there were no particular regulations and guidelines for its use. This has been considered as one of the reasons for its almost unbounded expansion in UK along with the reduction in the cost of installation and maintenance of video surveillance setup (Goold, Loader and Thumala, 2013, p.p.977-980)

In United States, video surveillance laws and policies are different in each state. Federal government does not have a concrete law that applies to the whole country. For instance, states like New York, Rhodes Island and California prohibit installation of cameras in any area or room where one expects complete privacy like bathroom, changing rooms, etc. In Delaware and Connecticut, any establishment that utilizes cameras for surveillance must display a notice or inform people coming and going from the establishment about the cameras. Once, people become aware of presence of cameras, they renounce their right of privacy in that establishment. In Florida, it is illegal to make video of people secretly in bathroom and changing rooms whereas same rules are not applicable to the public place like beach (Video University, 2015).

The constitutional law that deals with the few of the aspects of the video surveillance are First and Fourth Amendment. The First Amendment pertains to freedom of expression, religion and assembly (First Amendment). The Fourth Amendment protects people from ‘unreasonable searches and seizures’ (Fourth Amendment).

There are few federal laws that deal with directly or indirectly with the video surveillance like Electronic Communication Privacy Act (ECPA, 18 U.S.C), Foreign Intelligence Surveillance Act (FISA, 50 U.S.C) and USA PATRIOT Act (Kerr, 2002 p. 607). They fail to limit the use of video surveillance. Fair Information Practices, even though they were just recommendations, were a step in the right direction. They gave basic principles on the personal data. For instance, people should be aware as to why and how much of their personal data is collected; they should be asked for permission before their data is collected; their data should be secured against loss or misuse; there should be redress and accountability if the said security fails and individual suffers due to loss or misuse of their data (Dixon, 2006).

European Union presents a different scenario than United States. Every country in the EU has its own guidelines and policies but they must accommodate the laws and policies of the European Union like General Data Protection Regulation. European Data Protection Supervisor also issued guidelines that serve as recommendations for all the organizations and institutions in the European Union who wish to avail the video surveillance facility.
These guidelines focus on the protection of personal data. Necessary actions should be taken for the privacy safeguards at the time of installation of system. Data Protection Officer, EDPS and other relevant stakeholders should be consulted about matters pertaining to data protection. The purpose for which video surveillance system is being installed should be made clear. The organization should be able to clearly demonstrate its need for such an intrusive system and properly explore other options, which are less invasive in terms of privacy (EDPS, 2010).

The guidelines also discourage the monitoring of employees during their work except in special cases. The establishment also needs to keep multiple factors in mind like camera locations, viewing angles, no. of cameras, times of monitoring, resolution and image quality. The guidelines clearly state that such surveillance systems should not focus on the targets on the basis of their racial or ethnic origin, political opinions, religion, philosophical beliefs, trade union membership, data concerning heath and sex life. It is also states that monitoring should not be carried out in areas where people have higher expectations of privacy. Unlike US, places like offices, leisure area, waiting rooms, lounge rooms, etc are also included. The establishment is not allowed to do covert surveillance of any individual or group of individuals unless there is investigation of a very serious crime going on. Even in the special cases, authorization from competent senior decision-making officials or judge must be obtained. ‘Talking CCTV’ are prohibited unless used as back-up system for access control (EDPS, 2010).

The guidelines clearly define the retention period for the video recordings. For example, if surveillance system has been installed for typical security purposes, video should not be retained for more than one week. For areas outside the premises of the organization where cars and pedestrians could be videotaped frequently, the retention period is to be 48 hours. In general, EDPS recommends shorter retention periods. As per guidelines, the fewer the people who have access to the footage of the surveillance footage, the better it is. Security measures should be taken that footage is not leaked during transmission, in storage or from access point. Proper legal and defined procedures should be followed for transfer or disclosure of surveillance data. It is necessary that public be notified regarding presence of video surveillance system, for example, by on-the-spot notice. (EDPS, 2010)

After GDPR, many of the recommendations in the EDPS guidelines have become part of regulation and establishments installing video surveillance setups need to comply with them. Even more strict approach is being taken to ensure the protection of personal data (Patel, 2018). As in Luxembourg, it was notified by CNPD in CCTV guidelines that all obligations under GDPR should be complied (CNPD, 2018).

**Conclusion**

Video surveillance has its advantages and disadvantages like all other systems in the world. Multi-layer approach needs to be taken in effectively decreasing the disadvantages of this system. Advancements in technology can curb few of the drawbacks but regulation and laws need to keep up with the new paradigms in the technological fields. What technology can’t achieve may be achieved via regulations and laws, and vice-versa.

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Growth of Cryptocurrency: An Assessment

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Abstract

Cryptocurrencies are an encrypted, digital peer-to-peer network used for facilitating digital barter, developed ten years ago. Cryptocurrencies provide anonymity while making transactions and have a decentralized structure when compared to other currencies. The first cryptocurrency can be traced back to the period of financial crisis (2007-08). The financial crisis pointed out the instability and the flaws of the prevalent currencies. This resulted in the introduction of a digital, decentralized currency - Bitcoin, which did not require the involvement of any third party. Since the introduction of Bitcoin in 2008, numerous cryptocurrencies have emerged in the market. Cryptocurrency named Namecoin was introduced after Bitcoin back in the year 2011, which was later followed by Litecoin and other respective cryptocurrencies. Bitcoin obtained significant attention after its consistent rise in prices and market capitalization. In 2017, Bitcoin’s price was nearly $19,000 and held a market capitalization of $314 billion USD making it the oldest, popular and highest valued cryptocurrency of all time. Currently, the market capitalization of Bitcoin has declined to $63.6 Billion and its price stands at $3,638 USD. Cryptocurrencies have observed a varied acceptance around the world. Countries like Japan, USA, Germany, Australia and many more are accepting cryptocurrencies, but these countries take some preventive measures to avoid its use for illegal transactions. Whereas, Countries like China, Vietnam, Russia, Bolivia, Columbia and Ecuador have banned the use of cryptocurrencies in their countries. Certain countries like India, Jordan, Thailand and many more remain uncertain and are yet to decide regarding its legality in their countries. Till date, a major concern remains the sustainability and stability of cryptocurrencies in the future. This paper focuses on the history of cryptocurrencies and their performance over a period 2008-17. This paper throws light on the exchange platforms and their market capitalization.

Keywords: Cryptocurrencies, digital, capitalism

Introduction

Bitcoin is a decentralized digital currency in an online system. It was created by an anonymous identity using the pseudonym “Satoshi Nakamoto” in 2009. The first unit of Bitcoin was issued through an open source software. Unlike fiat money, bitcoin is not printed. Instead it is mined using a computing power cryptography technology. Bitcoin is the most popular and accepted cryptocurrency. Unlike, other online currencies bitcoin has a market capitalization of 60 Billion USD. Its use as a payment mechanism has increased due to a rise in its acceptance rate. Despite a big increase in the value of currency, it still seems to be staggering in retail transactions.

Several reasons attribute to explain the rise of Bitcoin. But the major reasons for its rise can be credited to its acceptance among different economies, vendors and governments. Japan introduced the Virtual Currency Act in March 2017 and later made Bitcoin as a legal tender in the country from April 1st, 2017. This attracted various investors and made bitcoin one of the sources for investment. Other contributing factors of increase in value of Bitcoin are increased acceptance in countries like Marshall Islands, Japan, Venezuela and predictions by experts like Andreas Antonopoulos and Brian Armstrong. Legalizing Bitcoin in countries like Australia, USA etc. opened pathways for new sources of finances for the retail and institutional investors. Many Multinational Companies like Dell and Microsoft started accepting bitcoin as a mode of payment in 2014. The payment of
bitcoin was partnered by the company through coinbase. However, Currently Dell no longer accepts bitcoin as a mode of payment due to low demand and high transaction fees. The company discontinued the use of cryptocurrencies in 2017. Portfolio Investments are yet to take into consideration different types of cryptocurrencies for investors. To lend credibility to bitcoin and other cryptocurrencies many financial advisors and institutions persuaded investors to opt for investing in the underlying infrastructure of bitcoin - The Blockchain Technology. Blockchain is a decentralized, distributed, public ledger. According to several experts, blockchain technology held the potential to disrupt the existing financial infrastructure. Blockchain had a decentralized structure and provided anonymity in transactions. Investors would invest in companies which aimed at adopting the blockchain technology and integrating it in their system.

Blockchain Technology - Diagram 01

Diagram 01 reflects the way the blockchain operates.

A network of nodes makes up the blockchain. Computers connected to the blockchain network use a client to perform tasks of validation and relaying transactions. Each node is an administrator in the blockchain and joins the network voluntarily. In a blockchain, everyone has an incentive for participating in the network. Nodes are mining and verifying transactions taking place through Bitcoin. They are rewarded with bitcoins by solving computational puzzles.
Literature Review

The origin of cryptocurrency can be traced back to the time of financial crisis in USA during 2009. Bitcoin was the first cryptocurrency to come into existence and perhaps remains the highest valued. Satoshi Nakamoto invented the bitcoin in 2008. The cryptocurrency was invented in order to avoid damage that occurred during the financial crisis in 2007-2008. Nakamoto focused on making a digital currency that would revolve only within the hands of their users. Bitcoin is a decentralized digital currency which means it isn’t within the control of any authority or third party. Making it a source for unhindered alterations for its users. Namecoin was the second cryptocurrency to be introduced in the market following bitcoin. The cryptocurrency made its appearance in 2011.

Pradipta Kumar Sahoo in his study provides us with statistical data and research regarding the progress of Bitcoin from 2008. The paper aims at revising past performance of Bitcoin and takes into consideration two essential factors – Firstly, the Transaction Volume and Bitcoin log return. Transaction Volume determines the growth of bitcoin and the bitcoin log return the volatility of the cryptocurrency. The study uses the GARCH and ARCH methodology to test the volatility of the cryptocurrency. GARCH Methodology shows the cryptocurrency as a highly volatile currency. According to Sahoo, Bitcoin may obtain more acceptance in the future if it manages to maintain its stability as a currency.

A research conducted by Peter D. DeVries (2016) provided a general overview of the cryptocurrency market and its threats and opportunities. The paper focuses on the integral parts of the cryptocurrency and highlights the strengths and weakness of cryptocurrencies. Furthermore, the paper takes into consideration statistical data to examine the awareness of Bitcoin and other major cryptocurrencies. Concise reports and data on the varied acceptance of cryptocurrencies among different countries makes it prospective. The paper states the potential of upcoming technology to overcome the limitations of Bitcoin and the capabilities of cryptocurrencies as a major currency.

Dr Garrick Hileman and Michel Rauchs (2017) further investigated on cryptocurrencies and have provided a detailed global benchmark study including surveys from the primary participants in the crypto market. The study focuses on the four key cryptocurrency sectors – Exchanges, Wallets, Payments and Mining. Geographical and statistical data is collected based on surveys conducted around the world. The study sheds light on the uses of cryptocurrency and divides it into four segments, i.e. Speculative digital asset, Medium of Exchange, Payment Rail and Non-monetary use cases. Estimates of the cryptocurrency user population region-wise is also mentioned. The study further investigates the key sectors and makes divisions to organize and classify the data. Exchanges are divided into three types of activities i.e. Order-book exchange, Brokerage Service and Trading Platform. The study also investigates the loop holes in the security measures of cryptocurrency and the role of exchanges in it.

It is important to understand that cryptocurrencies do not hold any sorts of intrinsic value. These digital assets hold monetary characteristics but are not governed or connected to a sovereign currency. They derive value only from the belief that they may be exchanged for other goods and services, or a certain amount of sovereign currency, in the future. Although there remains the involvement of third-party institutions, almost exclusively non-banks, which have been playing an active role in the development and operation of the digital currency. One major advantage of a digital currency is that it has a global reach design.

Using cryptocurrency allows users to exchange value digitally without third party oversight. It works on the theory of solving encryption algorithms to create unique hashes that are finite in number. Users are able to exchange the physical currency due to a combined network of computers verifying transactions. There is a finite number of bitcoins that can be generated which would result in its rarity and prevent overabundance of the currency. The framework and structure of this cryptocurrency was designed keeping in mind the difficulties people faced during the Financial crisis of 2007-2008. If cryptocurrencies are accepted, the world may also observe variations in all its associated activities which may lead to changes in the political and financial world. Changes would occur in the underlying base of economies. The rise in transaction costs determines a growing user acceptance.
Over the last few years, there has been increased acceptance of cryptocurrencies among major institutions such as Microsoft, Dell, KFC and many other organizations. Venezuela became the first country to make its own cryptocurrency – The Virtual Petro. Marshall Islands also followed the footsteps of Venezuela by introducing its own cryptocurrency and making cryptocurrencies as its legal tender. These steps were significant in order to boost the economy and establish flexibility in transactions.

Most of the bitcoin mining takes place in countries like China, Japan, USA and South Korea. After reviewing the potential of the cryptocurrency, China banned the use of cryptocurrencies and prohibited the operations of exchanges within its borders. On the other hand, there has been an enormous rise in the use of cryptocurrencies for various reasons in countries like USA, UK, Japan, Venezuela and South Korea.

Objectives of the paper are as follows.

1. To study the history of cryptocurrencies.
2. Legal and illegal uses of cryptocurrencies.
3. Study presence of cryptocurrency exchanges.

Cryptocurrency History

It is crucial to inspect the roots of cryptocurrency in order to understand their reliability and future as a currency. Cryptocurrencies have largely been used due to their features which overpower other currencies.

Technical Foundations

The concept of cryptocurrencies could be dated back to the early 1980s. An American cryptographer named David Chaum invented a blinding algorithm that remains central to modern web-based encryption. The algorithm was capable enough for secure, unalterable information exchanges between parties, laying the groundwork for future electronic currency transfers. This phenomenon was known as “blinded money”. By late 1980s, Chaum planned on commercializing the concept of blinded money in association with other cryptocurrency enthusiasts. Chaums founded, DigiCash, a for-profit company that produced units of currency based on the blinding algorithm. However, unlike most of the modern-day cryptocurrencies, DigiCash wasn’t decentralized. Digi Cash dealt directly with individuals, until the Netherlands central bank interfered. Unfortunately, DigiCash was altered and agreed to sell only to licensed banks curtailing its market potential. DigiCash couldn’t survive for long and had a decreased demand.

An accomplished software engineer named Wei Dai published a paper on b-money, a virtual currency structure that included the basic components of modern cryptocurrencies, i.e., Anonymity protections and decentralization. Although, b-money never emerged as a means of exchange.

Shortly, after chaum an associate named Nick Szabo developed and released a cryptocurrency called BitGold, which used the blockchain system that is the base for several modern cryptocurrencies in the market. However, BitGold met a similar fate as DigiCash and is no longer used as a means of exchange.

Virtual Currencies before Bitcoin

Digicash brought along imitators such as Russia’s WebMoney which existed in other parts of the world. In the United States, another prominent virtual currency emerged in the late 1990s and 2000s known as e-gold. E-gold was created and controlled by a Florida-based company with the name e-gold. The company functioned as a digital gold buyer and provided its customers and users with digital “e-gold”- units of currency denominated in ounces of gold, in exchange for jewelry, trinkets and coins. E-gold users could trade their holdings with other users, cash for physical gold, or exchange their e-gold for U.S dollars.

By mid-2000s, e-gold processed billions of dollars in transactions annually and had millions of accounts. Despite, e-gold’s huge success its relatively lax security protocols made it a popular target for hackers and
scammers, leaving several users prone to financial loss. Soon, most of e-gold’s transaction activity was legally dubious – its liberal legal compliance policies made it a victim of money laundering operations and small-scale Ponzi schemes. The platform faced legal pressure from mid to late 2000s and finally ceased to exist in 2009.

**Bitcoin and Modern Cryptocurrencies**

Bitcoin was first outlined in a 2008 white paper published by Satoshi Nakamoto, a pseudonymous person or group. Bitcoin is recognized as the first modern cryptocurrency - the first publicly used means of exchange with decentralized control, user anonymity, record-keeping via a blockchain, and built-in scarcity. Nakamoto released the first Bitcoin to the public in early 2009. A group of enthusiastic supporters played an integral role in exchanging and mining the currency. The first bitcoin transaction was done between Hal Finney and Satoshi Nakamoto where Hal Finney received 10 bitcoins from Satoshi Nakamoto. Later the first bitcoin to USD transaction was done by a software developer named Martti Malmi where he sold 5,050BTC for $5.02 to New Liberty Standard. By March 2010, the first bitcoin exchange named Bitcoinmarket.com started operating. The first real-world transaction with bitcoins took place in Florida on 22 May 2010, where Laszlo Hanyecz bought two pizzas for 10,000 bitcoins.

Soon modern cryptocurrencies like Litecoin, Namecoin and Swiftcoin started making their debut in the market. Litecoin was created in 2011 by the developer Charlie Lee. It is termed as a ‘silver’ to bitcoin’s ‘gold’. Litecoin has a few differences compared to bitcoin. Litecoin transactions are faster and the protocol uses a different consensus mechanism called 'scrypt' rather than ‘SHA-256’ proof-of-work miners use in Bitcoin. Litecoin reached a market capitalization of $1 billion after its inception in 2013. Litecoin is preferred over Bitcoin due to its Speed of transactions. Block times are 2.5 minutes, making transactions faster than bitcoin. Litecoin stands as a strong competitor as it has more coins than bitcoin and miners will produce 84Million Litecoin. This increases market liquidity and adds digital scarcity to tokens.

Ethereum on the other hand evolved from Vitalik Buterin’s discontent with limitations of Bitcoin. Vitalik Buterin aimed at using the blockchain for other things and requested for a scripting language for Bitcoin to make development of applications on the blockchain possible but his request was rejected. On November 2013, Vitalik Buterin published an Ethereum whitepaper describing the proposed technology. On January 2014, Development of Ethereum platform began. Initially, the development of this platform was under a Swiss Company named Ethereum Switzerland GmbH. Ethereum development team consisted of Vitalik Buterin, Mihai Alisie, Anthony Di Iorio, and Charles Hoskinson. The Ethereum team opted for a crowdsale for the development funding. The crowdsale ran from July to August 2014 and allowed users and investors to purchase Ether (tokens on future Ethereum blockchain) in exchange for Bitcoin. Frontier was the initial stage of the Ethereum network. Users could buy and sell Ethereum, perform mining of the cryptocurrency, build, test and upload Ethereum smart contracts and distributed applications. Frontier was released publicly on July 30, 2015.

By late 2012, Word Press became the first major company to accept payments in bitcoin. Later, Other major companies like Newegg.com, Expedia, and Microsoft followed.

**Reasons for Growth in Cryptocurrencies**

**Uses of Cryptocurrencies in the modern financial markets**

A major advantage for cryptocurrencies is its growing acceptability in both sides of the world. The initial criteria for a currency to establish itself as something of value is its acceptance rate around the world. The growth of cryptocurrencies indicates its success as a currency. Bitcoin attained the stature of the most lucrative investment in the past years. Most cryptocurrencies have also obtained increasing acceptability around the world. Cryptocurrencies have more brighter value as investment against a currency due to volatility of its price. Despite such setback’s cryptocurrencies have achieved acceptance among various countries and organizations. In developed countries like USA and Japan Bitcoin ATMs have been established enabling availability among people. This enables the conduct of illegal activities which makes it challenging to trace them. The legal and illegal uses of cryptocurrencies vary in range.
Legal Uses

Bitcoin is a digital currency which does not involve a third-party banking service to complete transactions. This keeps bitcoin transaction fees low. Bitcoins have also received acceptance among different organizations and companies. These transactions occur with the help of a digital payment processor service which enables one to take bitcoin payments on platforms like Word press. It is important for the user to hold a bitcoin wallet and sign up with a digital payment processor service like Bitpay and CoinBase. In order to accept bitcoins, the user must use a bitcoin payment integration. By 2014, Several Organizations and Companies were accepting bitcoin and other cryptocurrencies as mode of payment. Major companies like Overstock, Expedia, Subway, Paypal, Microsoft accept only major cryptocurrencies like Bitcoin. Certain companies like Dell discontinued their services of payment through cryptocurrencies like Bitcoin due to high transactions costs and low demand.

Illegal Uses of Cryptocurrencies

Cryptocurrencies are favorable due its speed, cost and security. Anonymity in transactions has given rise to several potential threats for the world. Anonymity in cryptocurrencies allows cybercriminals to avail bitcoin as a form of extort payment by keeping the victims hard drives as hostage. These schemes cost the hackers some pennies, but the results clearly outweigh them making it a prevalent crime in the digital world. The world observed maximum crypto extortion during the year 2014. An example of such a case is the June 2014 case where mails were sent threatening small business enterprises and retailers in USA with allegations of terrorist activity if they were unable to buy bitcoins before a stipulated date. A similar instance took place on May 2017 where a ransomware worm named Wannacry seized the data of several institutions and companies. The Ransomware demanded payment through bitcoin in order to retrieve the data.

Bitcoin users face the possibility of theft, scams and frauds, which is made easier due to the structure of Bitcoin and lack of regulation. Since no central authority exists there is no insurance in fraudulent activities. There exist several illegal uses of cryptocurrencies. Initial Coin Offerings are used by people who want to start their respective altcoins. This is done in order to raise funds through crowdfunding. Still most of these crowdfunding attempts are scam, where the scammer takes away the money. Scammers can claim the ICO and fail and run away with the money. Money Laundering is a process through which money acquired from undertaking illegitimate activities like terrorist activities and drug trafficking are disguised as money received from legitimate sources. Since the rise of digital or virtual currency, its misuses have also increased to facilitate activities of money laundering. This became evident in the case of Liberty Reserve, a company indulged in transfer and payment processing of currency. This was based in Costa Rica that was accused by the U.S Department of Justice (DOJ) for laundering $6billion for cyber-criminals, drug trackers, child pornographers and other deleterious actors. It was one of the biggest money laundering cases in the U.S Silk Road, a bitcoin based online market was seized and its owner and operator, Ross William Ulbricht was arrested for money laundering. Silk Road was launched in 2011 and operated as an online market that exclusively provided illegal goods and services like drugs, and murder for hire in exchange for bitcoins. The website consisted of over 13,000 listings for drugs, software programs, fake passports, pirated media content and computer hacking facilities. Face-to-Face trading of bitcoin has occurred in cities like Bangkok, Bratislava, London, Helsinki, Berlin, Tel Aviv and Toronto. Individuals involved in this type of setting meet at marketplaces to purchase bitcoins in exchange for cash. These transactions are of major concern due to its transformation towards a platform for money laundering. The concern being the fact that people can exchange bitcoin or something considerate in value through these platforms. Resulting in easy sales of illegal services and purchasing large amounts of digital currency with regular currency and conversion into another nation’s currency leading to bank deposit.

Unethical hacking allows access into different elements of bitcoin like exchanges, marketplaces, wallets and mining activities. The main objective among such hackers is to find the weaknesses in coding and attack accordingly. With increasing number of users and transactions, hackers are gaining access to personal wallets and even the entire transaction itself. A prominent and famous case to be considered is the theft on March 2012 in the UK based bitcoin exchange ‘Bitcoincia’ where 18,547 Bitcoin were stolen from user’s accounts. The absence of a central regulation authority disables the possibility of storing passwords or issuing replacement
keys. This makes cryptocurrencies weaker compared to banks in cases of theft or loss. Another element that can be hacked is bitcoin wallets. Two parts that remain in risk are – the wallet and private key. The private key is generally stored either online or offline through means that don’t include using the internet. Many wallet customers keep around 8- percent of bitcoins offline for protection against hackers. Wallet holders can access their wallets through a private key. One major drawback of cryptocurrencies is its inability to insure against loss or theft. Allinvain, BitcoinTalk forum member, became the first victims to loss of bitcoins due to hacking. The loss stood at 25000 bitcoins. Bitcoin has also been in the attention of many fraudsters resulting in looting and deceiving consumers. These include Ponzi schemes, imitation websites and phishing emails. Ponzi Schemes are fraudulent investing scams, which promise higher returns with low risks to investors. The returns to existing investors are paid through funds contributed by new investors. The Securities and Exchange Commission have issued warnings raising concerns regarding fraudsters leading investors towards Ponzi schemes in which virtual currencies are used to fabricate investments. Phishing involves the fraudulent activity of maintaining a fake reputed entity in order to obtain the confidential information like password, credit card details or security number. These generally include a malicious link that takes the user to a site which leads them to reveal sensitive information. These practices include the exchange of fake bitcoin wallets and private key to a user through mail in order to obtain bitcoins.

Its presence has even spread and widely been circulated in the dark corners of the society as well. The dark web is a channel of network which involves the trade of illegal activities around the world. Bitcoin and several other cryptocurrencies are the sole currencies on the dark web. Most illegal business trade and transactions are done through this channel. The Silk Road was an online black market which operated through the dark web known for its sale of drugs. In October 2013, The Federal Bureau of Investigation shut down the website and arrested the founder Ross Ulbricht. Since it does not require the review or authentication of any central authority transactions are anonymous.

Terrorist Financing is an area of concern when considering the use of cryptocurrencies such as bitcoin. Cryptocurrencies are borderless, that can attract terrorist finances as transfer of funds becomes convenient and feasible. This approach keeps them at a distance from legal barriers. Rise in virtual currencies can spread threat finance by increasing anonymity and efficiency of terrorist attacks. Although the real currency holds a better potential as a medium to finance terrorist activities due to difficulty of tracing the transaction back to the person. Exploitation of Women and Children is achieved using cryptocurrencies. It is used to fund child pornography, sexual exploitation, and human trafficking. Bitcoins provide their users with anonymity which is an important element for these users. So, users of such services are shifting towards bitcoin to conduct such activities. The victims that are exploited are part of deprived countries. Bitcoin permits human traffickers the sale of women for prostitution without the fear of legal consequences.
The valuation has been unstable from the period 2008 to 2010. The value of the currency started steadily rising till 2014 where it reached the price of 771.4 USD. The currency started declining later in 2015 and then saw a steep rise in price till start of 2018.

Ethereum prices have been rising consistently as shown in the above diagram. Earlier its average price stood at 0.88 USD in 2015 and shot up to 504.63 USD in 2018.
Litecoin has been highly volatile compared to other cryptocurrencies. The valuation of Litecoin increased in 2015 till 29.45 USD and then declined to 3.47 USD. Later the cryptocurrency rose up to 111.60 USD. The rise of new cryptocurrencies, especially during 2017-2018 led to rise in prices of bitcoin. A concern of bitcoin was its credibility and sustainability as a currency for daily operations. Currency used in the present day for daily operations has an advantage unlike cryptocurrencies- it is accepted widely. Cryptocurrencies haven’t yet achieved the desired stability and acceptance when compared to other currencies. Despite, all these issues there has been the introduction of different measures to counter such issues of cryptocurrency. To ease the transactions, Lightning Deal was introduced in the market to provide desirable ease and flexibility of making transactions while using cryptocurrencies. Earlier, The Bitcoin network could process only 7 transactions per second (TPS). Nowadays, it surpasses the reach of major companies like Visa which process 24,000 TPS and can go around 60,000 TPS. The growth of cryptocurrency may completely revolutionize the payment mechanisms around the world. Cryptocurrency holds the capabilities of a brighter future with complete anonymity. But Anonymity would also increase the risk of illegitimate transactions inside the economy resulting in misuse of the currencies. Cryptocurrencies are used for various reasons ranging from legal to illegal uses.

The Rise of Bitcoin in 2017 has attracted a worldwide attention in the market across companies and retail investors. Cryptocurrencies have experienced a consistent rise in the market. Along with bitcoin other important currencies also show a remarkable rise in their values. The Diagram 1 and 2 reflects this. The world also observed the rise of other important cryptocurrencies such as Ethereum, Litecoin, TRON, Neo and many more. The market capitalization of Bitcoin saw an immense rise from 15 Billion USD in January 2017 to 192 Billion USD in January 2018. Other respective cryptocurrencies such as Ethereum went from 961.8 Million USD to 117.4 Billion USD.
Modern Cryptocurrencies have been an area of interest for various cryptocurrency enthusiasts. Ethereum has received the maximum attention.

Unit = United States Dollar ($)
The bitcoin currency saw a consistent rise compared to other cryptocurrencies till start of 2018.
Market Capitalization of different Cryptocurrencies

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTC(Bitcoin)</td>
<td>$10.2B</td>
<td>BTC- $2.7B</td>
<td>BTC- $5.8B</td>
<td>BTC- $15B</td>
<td>BTC - $192B</td>
</tr>
<tr>
<td>LTC(Litecoin)- $608M</td>
<td>XRP - $474M</td>
<td>XRP - $169.8M</td>
<td>Eth - $961.8M</td>
<td>ETH - $117.4B</td>
<td></td>
</tr>
<tr>
<td>XRP (Ripple)- $164M</td>
<td>LTC - $45.7M</td>
<td>LTC - $135M</td>
<td>XRP - $247.5M</td>
<td>XRP - $52.1B</td>
<td></td>
</tr>
<tr>
<td>PPC (Peercoin)- $121M</td>
<td>XPY - $41.2M</td>
<td>ETH-$94.2M</td>
<td>LTC- $192.7M</td>
<td>BCH- $28.6B</td>
<td></td>
</tr>
<tr>
<td>OMNI - $77.6M</td>
<td>BTS- $25.9M</td>
<td>DASH - $24M</td>
<td>XMR- $166.9M</td>
<td>ADA- $16.5B</td>
<td></td>
</tr>
<tr>
<td>NXT (NXT Generation)- $47.4M</td>
<td>XLM- $16.6M</td>
<td>DOGE- $15.7M</td>
<td>ETC- $125.5M</td>
<td>XLM- $10.8B</td>
<td></td>
</tr>
<tr>
<td>NMC (Name Coin)- $47M</td>
<td>DOGE- $13.4M</td>
<td>PPC- $9.3M</td>
<td>DASH - $107.1M</td>
<td>NEO- $10.5B</td>
<td></td>
</tr>
<tr>
<td>QRK (Quark)- $20.9M</td>
<td>MAID - $13M</td>
<td>EMC- $8.5M</td>
<td>MAID- $54.1 M</td>
<td>LTC - $10.5 B</td>
<td></td>
</tr>
<tr>
<td>DOGE (Dogecoin)- $20.5M</td>
<td>NXT- $12M</td>
<td>XLM - $8.4M</td>
<td>REP- $51M</td>
<td>EOS - $9.1B</td>
<td></td>
</tr>
<tr>
<td>PTS (ProtoShares)- $16M</td>
<td>PPC-$6.9M</td>
<td>FCT- $8M</td>
<td>STEEM - $38M</td>
<td>XEM- $8.7B</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

Growing acceptance among countries and organizations, cryptocurrencies hold the potential to transform the way money is exchanged throughout the world. It is an integral step to inspect, analyze and categorize the hype of this currency with equanimity. To truly understand the sole reason of its existence can help us fuel its credibility and its scope as a currency among future generations. It is a crucial aspect to investigate the growth of cryptocurrencies around the world in order to examine their demand and progress. Cryptocurrencies have different drawbacks and different advantages over fiat currencies. With growing acceptance among various organizations and companies, these currencies may hold the potential to be used as a normal currency if it
becomes stable and widely accepted. To counter the issue of illegal activities funded through bitcoin and other cryptocurrencies several countries have centralized agencies handling the sale of cryptocurrencies as a form of investment. This enables control and makes the cryptocurrencies stable. With introduction of several measures to counter the drawbacks of cryptocurrencies, it holds the potential of a strong currency. Lightning Network solves the issue of high transaction fees and the long time period between transactions as well. Earlier, the transactions processing capacity was at 7 transactions per second. With Lightning Network, 60,000 transactions will be processed per second. Bitcoin and other cryptocurrencies can become reliable and usable in the future for daily use only if it becomes stable and insures users.

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The Role of Fixed and Mobile Broadband Internet Network on Turkey’s Economic Growth: Development of Industry 4.0 May Be an Unmissible Opportunity

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Abstract

The industry 4.0 notion, which was launched in 2011 and whose effects are still emerging in our country, has been on the agenda of the debates on the economic growth of developed and developing countries. Aside from being ready for industry 4.0, we are going through a period when all countries need to take immediate, direct steps to industry 4.0. At that point, the most significant activity is to ensure that information and communication technologies are accessible to the whole community. Together with the transition to globalization and information society, a period has started in which all participants in the society play an active role in economic growth and development. Accessibility to information technologies is increasingly important after information is cross-border. Both global access to information technology as well as in Turkey is increasing gradually. However, fixed broadband internet access, which is one of the main tools of access to information, is not sufficient and as a result the limitation of access to information arises.

Key Words: Industry 4.0, fixed broadband internet, economic growth.

Introduction

With the development of information and communication technologies (ICTs) in the world, where boundaries are becoming increasingly uncertain with the globalization and with the increasing popularity of it, the world has started to transform into a common trading market. The multidimensional nature of international trade leads to a gradual decrease in the global market of companies that remain committed to traditional production methods, which are only based on quality or only price policy. The 4th Industrial Revolution or the Industry 4.0 notion was introduced in 2011 at the Hannover Fair 2011 industry fair in Germany, marking the beginning of a new era (Aydın, 2018). In this process, especially the use of new communication technologies has been adopted and the implementation of cyber-physical systems in the manufacturing industry has become widespread (Prinz et al. 2016). Industry 4.0; it consists of a dynamic, real-time optimized and self-organizing structure that can be optimized according to different criteria such as future automation, virtualization of industrial production systems, the combination of people, objects and systems, cost, availability and resource consumption (Ittermann et. al, 2018). Conceptually Industry 4.0; it is a collective term that includes many modern automation systems, data exchanges and production technologies. This revolution is a set of values consisting of the Internet of Things, Internet Services and Cyber-Physical Systems (Kesayak, 2018).
1. Components of Industry 4.0

Cyber-Physical Systems: It is the integration of computing and physical processes (Lee, 2007).

Internet of Things: The Internet of Things (IoT) can be defined as a network, where Cyber-Physical Systems collaborate with each other through unique addressing schemes (Hermann, et al., 2015).

Internet of Services: Internet of services (IoS) enable service providers to provide their services online. IoS consists the complement of participants, infrastructure for services, business models and services. Services are offered and combined as value-added services by various suppliers. (Hermann, et al., 2015).

Smart Factories: Smart factories, one of the most significant steps of Industry 4.0; it is a multidimensional necessity involving the requirements of manufacturers, suppliers and consumers (NTE, 2018).

2. The Significance of Fixed Broadband Internet Through Industry 4.0

As the widespread of globalization and knowledge society, privately through the internet access, the access of information from limited recourses to the whole society and the inclusion of Industry 4.0; it is more remarkable for economic growth and development to take an active role in the process. Especially, in the trade area, and in the removed borders currently, the notion of industry growth and the use of fixed broadband internet, which are the basis of this notion are among the requirements of current age.

The information and communication technologies (ICTs) on a global scale have an important role in the development of societies and consequently the economic benefits and employment of all human resources. The information and communication services value is growing around the world. Roughly, 100 million human sources are employed in information and communication technologies (ICTs). As an economic value, global e-commerce is estimated at $ 25 million. In developed countries, it is seen that more than 70 % people purchase goods and services via internet (UNCTAD, 2017). Figure 1 shows the share of global ICTs in value added and GDP. As can be seen in figure 1, ICT have a share in GDP of $ 2.901 billion and 4.4 % in 2010, $ 3.379 billion and 4.3 % in 2014, and $ 3.223 billion and 4.3 % in 2015. The total value added of US, EU, PRC, Japan, India, Canada, Brazil, South Korea, Australia and Indonesia in the ICT is about $ 3.6 trillion (UNCTAD, 2017). ICTs that play an active role in many economic fields (logistics, manufacturing, food, building, energy, trade, health, education) are expected to reach $ 11 trillion in 2030 (BTK, 2010). ICTs are development locomotive currently.

![Figure 1: The Value Added of Global ICTs Services and its Ratio in GDP.](Image)

Source: (UNCTAD, 2017)

By the access to information and emerging the significance of communication, the world has ended to be monodimensional area, and a new social norm has been formed in which knowledge has acquired a cross-border dimension. At that point, the use of ICTs increased.
Figure 2 shows the development of ICTs on a global scale, mobile phone subscription and internet users are shown on fixed broadband subscriptions. In the figure 2, it’s seen that internet usage is becoming more widespread. In particular, mobile phone subscriptions seem to be at a level above fixed broadband subscriptions. Although an increase in fixed broadband usage is observed, that is not adequate. When the fixed-mobile broadband internet penetration of OECD countries is remarked, the country with the highest rate of mobile broadband is Japan with 138.8 %. Japan is followed by Finland with 135.4 % and Denmark with 116.4 %. Fixed broadband penetration rates are followed by Switzerland with 51.9 %, Finland with 42.4 % and Netherlands with 41.3 %. The average mobile broadband in OECD countries is 90.3 % and the fixed broadband penetration is 29 %. Turkey’s mobile broadband penetration rate is 62.2 % and the fixed broadband penetration rate is 12.9 % below the OECD average (Republic of Turkey Transport, Maritime Affairs and Communication Ministry, 2017).

Table 1: The Main Indicators for Turkey (2016).

<table>
<thead>
<tr>
<th></th>
<th>Turkey</th>
<th>Europe</th>
<th>Globe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed phone subscription rate (%)</td>
<td>14,3</td>
<td>37,7</td>
<td>13,6</td>
</tr>
<tr>
<td>Mobile cellular subscription rate (%)</td>
<td>96,9</td>
<td>118,0</td>
<td>101,5</td>
</tr>
<tr>
<td>Fixed broadband rate (%)</td>
<td>13,6</td>
<td>30,2</td>
<td>12,4</td>
</tr>
<tr>
<td>Active mobile broadband rate (%)</td>
<td>66,8</td>
<td>80,1</td>
<td>52,2</td>
</tr>
<tr>
<td>LTE / WiMAX extent (% of population)</td>
<td>82,5</td>
<td>92,2</td>
<td>66,5</td>
</tr>
<tr>
<td>Mobile cellular prices (% of GNP)</td>
<td>3,4</td>
<td>1,0</td>
<td>5,2</td>
</tr>
<tr>
<td>Fixed broadband prices (% of GNP)</td>
<td>1,0</td>
<td>1,2</td>
<td>13,9</td>
</tr>
<tr>
<td>Mobile broadband prices 500 MB (% of GNP)</td>
<td>0,6</td>
<td>0,6</td>
<td>3,7</td>
</tr>
<tr>
<td>Mobile broadband prices 1 GB (% of GNP)</td>
<td>1,8</td>
<td>0,6</td>
<td>6,8</td>
</tr>
<tr>
<td>Computer owner household rate (%)</td>
<td>58,0</td>
<td>79,6</td>
<td>46,6</td>
</tr>
<tr>
<td>Household rate that can access internet (%)</td>
<td>76,3</td>
<td>82,5</td>
<td>51,5</td>
</tr>
<tr>
<td>Internet user individuals (%)</td>
<td>58,3</td>
<td>77,9</td>
<td>45,9</td>
</tr>
<tr>
<td>Internet broadband widespread per users (kbit / s)</td>
<td>68,1</td>
<td>178,0</td>
<td>74,5</td>
</tr>
</tbody>
</table>

Source: (ITU, 2017b)
Turkey, in terms of fixed and mobile penetration rates, has lower level from the European average. While Turkey’s active mobile broadband rate is 66.8 %, in Europe this ratio is 80.1 %. And while Turkey’s fixed broadband rate is 13.6, in Europe average is 30.2 %. In terms of the computer owner household ratio; Turkey is above the global average with 46.6 % rate, but below the European average (European rate is 79.6 %). Especially, 3 large-scaled firms; Turk Telekom, Turkcell and Vodafone in Turkey, with the percentage of investments are increasing and ICT Authority is making progress at an increasing rate. In the fourth quarter of 2017, total investment in Turkey, Turk Telekom and mobile operators was thereabout 2.92 billion Liras. Particularly, infrastructure investments gather new users (BTK, 2017).

![Figure 3: The number of fixed broadband subscription for Turkey.](image)

Source: (BTK, 2017)

Remarking the number of fixed broadband subscribers in Turkey, which had 6 % rate in 2008. The amount of subscribers by gradually increased, at last in 2017, reached 11.9 % ratio. As of the 4th quarter of 2017, total internet user number is 62,280,191, mobile internet users reached 49,810,834, fixed and other internet users stroke 12,469,357 (BTK, 2017).

Conclusion

Economic growth and development in the 21st century are among the basic aims of all economies. At that point, the notion of Industry 4.0 is one of the significant issues of our agenda. The world has become a common market by logistics and development of internet network in the merchant area. It is inevitable for countries to be included in the Industry 4.0 process, so that they can have a share in this market or to protect their internal markets. It is evident that the Industry 4.0 notion is not only a process for developed countries, but also a broad process within all countries of the world, by the widespread use of ICTs. An individual enterprise can turn into a large activity area, that will change all economic balances. Therefore, it is extremely notable to facilitate access to information for the general public. One of the easiest and fastest way to access information is through the use of fixed broadband internet. It should be signed that the backbone of the Industry 4.0 notion is the internet. Turkey is located in the economic status of developing countries. To boost economic growth and to integrate the industry come to the level of developed countries to Industry 4.0 is required for Turkey. In order to take place for this integration, it is important to prepare the necessary infrastructure and other facilities to expand the use of internet to whole households at the core of the Industry 4.0. In comparison with Europe, fixed broadband internet rates are insufficient. For this reason, one of the most important steps Turkey will take, dissemination policies accessible to all households and to increase a young population with software. Additionally, tax deductions for home computers should be provided and steps should be taken to ensure that all households have computers.
References


Information Privacy in the Cloud: Actual and expectation

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Abstract

Privacy is one of the main concerns especially concerning the handling of personal information and its implications on the confidentiality of organizational and government information. Comparisons are made between user expectations and the actual reality when dealing with cloud-based information. The report finds that users have different expectations on the privacy of their information when operating on the cloud. For some organizations, sharing some information may be illegal and this could limit information sharing and hence affect the status quo. This research paper focuses on the issue of privacy in cloud computing. Also discusses the legal implications of information sharing on the cloud and the consequences that may arise. Information stored by individuals or businesses with third party service providers may have number privacy and protections compared to information stored by the original creators. It is therefore important to ensure that the relevant laws, policies, and regulations are put in place to ensure that the privacy of cloud-stored information is preserved.

Keywords: Privacy, Data confidentiality, Information security, Organizations privacy.

Introduction

Cloud computing technology is progressively being adopted by organizations and individuals for various operations. Today, there are hundreds of public, private, and community cloud platforms with thousands of users (Govinda, & Sathiyamoorthy, 2015). Across all cloud-based systems, privacy remains to be the greatest concern among users. Organizations and individual users alike are concerned about the privacy and risks that could affect the information stored in the cloud (Lustgarten, 2015; Ren, Zhang, Zhang, & Shen, 2015). For instance, a company that has stored confidential company documents on the cloud could be concerned that hackers could easily get access to this data.

It is, however, important to understand that different cloud computing systems raise different privacy and confidentiality issues. According to Kocabas, & Soyata (2015), some users believe that a lot of the computing activities that are taking place today will eventually shift to the cloud in the future. Whether this will eventually be realized remains uncertain. This research paper does not in any way oppose the adoption of cloud computing due to the privacy issues it presents but rather explores areas of improvement that could be applied to address the issues.

According to the National Institute of Standards and Technology (NIST), cloud computing is a model that enables ubiquitous access to shared network and computing resources that can easily be released by the service to provided on demand with minimal management requirements (Safi et al., 2018). There is a variety of cloud computing services that are provided today including data storage, video storage, photography, personal health records, social networking, and tax records among others (Kaaniche, & Laurent, 2017). Generally, any information that can be stored in a local computer can be stored in the cloud. For this reason, organizations have now shifted critical business operations such as emails, spreadsheets processing, and financial information to the cloud (Almorsy, Grundy, & Müller, 2016). An organization could store all its information on the cloud with one or multiple service provider.

Any time an organization or individuals share information on the cloud, questions of data privacy usually arise. The first stage of information sharing takes place when the data owner shares information with the cloud service provider (Adhirai, Singh, & Mahapatra, 2019; Hashem et al., 2015). This raises the question on whether it is
actually possible to legally share information in a cloud service. In a cloud computing system, there are a number of issues that could affect the privacy of the data (Li et al., 2018). For instance, it could be illegal to share some information. As a result, this could have huge implications on the status quo and the protection of the information.

When dealing with personal information, individuals are usually free to share it as they desire. The situation is more complicated for businesses and larger organizations. Disclosing personal information of their customers, employees or partners to a third-party cloud service provider is usually unrestricted (Zhao, Yao, Zheng, Qiu, & Ning, 2019; Prasad, Poonam, Gauri, & Thoutam, 2015). There are basically no laws that address this issue. Companies are therefore left to operate on the basis of their internal organizational policies. For instance, in the United States, privacy laws do not cover the sharing of marketing information (Yu et al., 2017). Even in instances where the existing privacy laws are applicable for specific categories of customer information, the disclosure of information to a third party service provider still remains unrestricted.

In the case of federal agencies, there are a number of laws that may have a bearing in the decision on whether to share the information with a third party. The Privacy Act of 1974 provides guidelines and standards for information collection, use and disclosure, especially when dealing with personal information (Sridhar, & Sriram, 2017). Sharing of information with a cloud service provider is a violation of personal privacy and the provisions of this Act.

Users have different expectations on the privacy of their personal data stored in the cloud. There are those whose understanding and knowledge about privacy issues is limited while others understand the risks posed by cloud data storage (Tang et al., 2016). The general expectation that cuts across the board is that cloud service providers will act responsibly and maintain the confidentiality of their data (Li et al., 2017; Xin et al., 2018). Users also have the expectation that cloud service providers have the necessary infrastructure to maintain the privacy of the data.

The reality is that user expectations are most far from reality. Cloud service providers tend to exempt themselves from taking responsibility for privacy breaches, especially in case of external attacks. This is done through their internal organizational policies, user agreement terms and conditions, and legal liability exemptions (Shah, & Raja, 2018). This research illustrates the key privacy concerns when that are consequences of cloud computing, the expectations of various users, the actual situation in regard to privacy, and measures that could be implemented to enhance user experience. Information privacy tends to have very critical legal implications. This research, therefore, pays particular focus on the legal implications of the current privacy issues in the industry.

Approach

The research will adopt a systematic literature review approach in the assessment of the actual situation against the expectations of the users of cloud services. The aim of the systematic review will be to focus on addressing the problem through the identification, critical evaluation, and integration of the findings made. High-quality individual studies will be selected to provide the required literature. At the end of the study, the literature should be able to establish the extent to which the research has progressed towards the clarification of the privacy problem in cloud computing. It should also be able to identify key relationships and contradictions between the expectations and the reality on the ground in regard to cloud computing. Thirdly, the research should also be able to formulate general statements summarizing the key issues raised by various researchers. Fourth, the literature should also be enough to enable the researcher to formulate a theory that shows the relationship between the contentious issues in the discussion. Finally, one should also be able to describe the direction for future researches in relation to the privacy of cloud computing.

The literature materials adopted for the research will be selected on the basis of the evidence and relevance. Considering the fact that the research is based on technology, the age of the materials selected must be carefully considered. The source of the research materials should also be taken into consideration. Information whose source cannot be verified will not be disregarded. In order to attain the research goals, a quantitative analysis of the information gathered from the literature materials will be carried out. This approach will be very important in
the analysis and critiquing various theoretical formulations and ideas developed by other researchers. At the end of the study, one should be able to develop his/her own theory based on the outcome of the analysis.

Discussion

There are many privacy issues that affect the privacy of information when dealing with cloud systems. The most common ones include data breaches, network security issues, locality of data, data access, exposure to DoS attacks, account hijacking, malicious insiders, permanent data losses, hacked interfaces, system parasites, shared technology, and compromised credentials. Each one of these issues is discussed in the section below.

Data Breaches

Cloud service providers are considered the most attractive target for attack by hackers. The severity of the attack is mainly dependent on the confidentiality and the privacy levels required for the data. Some of the most vulnerable types of information include financial data, health data, trade secrets and intellectual property (Sen, 2015; Henze et al., 2016). With this information, hackers can produce severe damage that could end up hurting the owners. Oracle (2019) reported that there has been an increased in the number of cyber security breaches of data in the last year. In another report by Verizon, data shows that a total of 1379 incidents were reported in 2018 and 66% of them were from specific malware. The Identity Theft Resource Center reported that a total of 668 data breaches compromised about 22,408,258 records in 2018. Overall the breaches cost the companies involved a total of $3.86 million in damage control (Security Score Card, 2018).

Network Security Issues

Issues in network security could also affect the privacy of information stored in the cloud. Data is most vulnerable when it is in transit. Hackers could infringe into the network infrastructure and obtain critical information while in transit to and from the cloud (Mxoli, Mostert-Phipps, & Gerber, 2017). This could expose private information. The consequences of this could be dire.

The Locality of Data

One of the main strengths of cloud computing is the fact that data can be accessed and retrieved from anywhere. In the absence of critical authentication and verification systems, private data could be accessed by hackers (Mehmood, Natgunanathan, Xiang, Hua, & Guo, 2016). A case example is a breach that occurred on Sony's systems occurred as a result of poor security systems. The result of the attack was that the company lost large amounts of private company data and unreleased films. After a lawsuit that dragged on for two years, Sony paid out $8 million in compensation to its former employees (Thomas, 2015).

DoS Attacks

DoS attacks are quite hard to deal with. This is because they occur randomly and are mainly designed to overpowered the existing resources of the cloud in order to deny clients access to information (Revision Legal, 2018). When DoS attacks occur on distributed computing systems, the consequences could be grave because data could be lost from different points thus resulting in a massive breach of privacy (Ab Rahman, & Choo, 2015). Most of the services providers are yet to put in place measures that protect their systems form DoS attacks.

Account Hijacking

Hackers use phishing attacks to deceive users to provide private information about their cloud-based accounts. This is achieved through the use of emails and links that look legitimate but once clicked, they redirect the users to third party websites that collect key information (IBM, 2019). This exposes data stored in the cloud to illegal and malicious use.
Malicious Insiders

One of the greatest concerns when storing data on the cloud is the trustworthiness of the third party service providers. Liu, Deng, Choo, and Yang (2017), show that most of the information losses and data breaches are usually a result of human mistakes. Malicious employees could access the private information of a particular client; expose it, thus causing massive harm to the individual or organization concerned (Prinzlau, 2019). Besides the development and implementation of internal controls, this is one of the hardest risks to data privacy to address (Liu, Ning, Xiong, & Yang, 2015). The relationship between the cloud service providers and the clients mainly centred around trust and goodwill.

Shared Technology

Service providers of cloud operations provide a platform on which their clients can store, manage, and run their operations. Mostly, these platforms are shared and this also emerges as a weak point that could be exploited by potential hackers. If a multitenant attack was to occur, the consequences could be quite massive (Arpaci, Kilicer, & Bardakci, 2015). In order to avoid such exposure, it is important for service providers to advise their clients to develop multifaceted security controls.

Hacked Interfaces and APIs

User interfaces and APIs form a very critical part of connections in cloud computing. They help to ensure that integration and distribution of resources exist among various clients. These connections could, however, be exploited by hackers thus exposing private information to multiple breaches (Nikkhah, & Sabherwal, 2017). It is always important for service providers to ensure that proper security systems are implemented in the development of APIs and user interfaces.

Expectations

It is the expectation of every user of cloud systems for data storage services that their information will be fully secured. This section proposes measures that can be put in place to reduce the vulnerabilities that violate the privacy of user data.

Cloud service providers usually take advantage of the naivety and ignorance of their clients on legal and technological information to avoid liability for privacy breaches. However, it is important for users of these services to check if the service provider has a well-documented security plan and operation policies (Xia et al., 2016; Yang, Li, & Niu, 2015). In the absence of this information, the data is not safe. Before sharing information with the service provider, it is also important to ensure that the terms and conditions of the contract put liability on the service provider for any breach that may occur due to their negligence (Ganorkar et al., 2018).

To protect the network and other systems from illegal access and hacking, a multifactor authentication system can be implemented. Components such as mobile verification, one-time use passwords, and face recognition could be used to improve data security in cloud systems (Wang, Wang, Ren, & Lou, 2009). Multifactor data security improves the security of information stored in the cloud. Data access systems should be encrypted in order to improve the privacy of data (Zhang et al., 2015). As earlier indicated data in transit is highly vulnerable and can be accessed by hackers who could end up causing massive damage. Data backup systems too should also be encrypted.

There are different regulatory requirements required when handling data from different sectors. For instances, the federal government provides standards for handling financial data through various policies and laws such as the Sarbanes Oxley Act. Health data is regulated under the HIPAA regulations (Srinivas, Das, & Rodrigues, 2018). Compliances with these regulations will be a critical and effective approach towards ensuring that private information stored in the cloud is fully protected. Organizations that breach these regulations could be sued for breach of privacy.
Cryptographic methods have emerged as some of the most secure methods of securing data stored in the Cloud. There are a number of cryptographic algorithms that enable users to evaluate the trustworthiness of other users before they can allow them access to their data (The Conversation, 2018). Methods such as authenticated encryption could also help to ensure that the privacy of information is maintained.

Conclusion

Cloud computing has proved to be one of the most revolutionary emerging technology. It has transformed the manner in which data is handled and managed by individuals and organizations. Companies have been able to use this technology to cut down on the operational costs. Despite the multiple advantages of cloud systems, privacy still remains to be one of the main concerns of many users. There is no guarantee that data stored in the cloud will be secure and the extent to which it is exposed. Most third-party cloud service providers exempt themselves from blame when data privacy is breached. This research has adopted a systematic approach to review the current literature on the problems associated with the privacy of data stored in the cloud. Expected measures that could be applied to remedy the current vulnerabilities have also been discussed in details. Securing data in order to preserve its privacy is less expensive compared to the legal and financial implications of dealing with the damage.

References


The Relationship Between Economic Freedoms and the Informal Economy: An Application on the Member States of the Organization of Islamic Cooperation

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Abstract

The reduction and ultimately the elimination of the informal economy emerges as an important problem for the countries in terms of effectively collecting tax revenues, preventing unfair competition and increasing confidence for the state. Increasing economic freedoms contributes to the reduction of such economic activities. The aim of the study is to determine the effect of economic freedoms on informal economy for the member states of Organization of Islamic Cooperation (OIC). It covers annual panel data of 44 countries from 1999 to 2015. In the study, Fixed Effects and Random Effects Models are applied. The findings of the study point out that there was statistically significant and negative relationship between economic freedoms and informal economy. According to the results, one-point increase in Economic Freedom Index led to a nearly 0.13% reduction in the size of informal economy.

Keywords: Economic Freedoms, Informal Economy, Random Effects, Random Effects.

Introduction

The concept of freedom, defined in many ways; in general terms, expresses a whole set of political, civil and economic rights. In this context, it is observed that societies with high freedom levels are more prosperous than other societies. However, it is an important issue discussed nowadays whether freedoms lead to development, or whether development or freedoms improve (Tunçsiper ve Biçen, 2014: 26).

The main feature of the informal economy concept is that economic activities are concealed from the state, not recorded, not audited even though the economic activities have actually been realized. As a result, these economic activities do not contribute to the calculation of Gross Domestic Product (GDP). In spite of significant increases in the roles and responsibilities of the state, countries have made some efforts to eliminate or minimize informal activities due to insufficient income sources. Even though some of these activities are legal activities, they can still be considered as informal activities due to not being registered for tax evasion (Teyyare, 2018: 52). Considering the fact that the most important source of income required to cover the state expenditures is taxes, the tax revenues of the state will decrease significantly in proportion to the existence and size of the informal economy. This situation leads to the inability of the revenues to meet the expenses and the budget deficits. In case the deficits reach large sums and are financed by borrowing, serious interest payments are encountered in the budget. The increase in the share of interest in the budget will lead to a decrease in the resources to allocate to efficient and productive areas.
Another disadvantage of the informal economy is that, in terms of the registered persons and institutions that pay their taxes regularly, it brings about unfair competition, deterioration of the income distribution against them, thereby causing the loss of state credibility. In this study, the relationship between economic freedom and informal economy was investigated in the scope of the members of Organization of Islamic Cooperation from the point of view that informal economy expected to be lower in countries where economic freedom is higher. There are many studies on economic freedom and economic growth but few studies on economic freedom and informal economy. This study is expected to contribute to the literature at some level.

Theoretical Background

Berggren (2003) defines economic freedom as a market economy. In other words, he aimed to find out in what degree it entails the possibility of entering into voluntary agreements within predictable and stable legal system, with a limited degree, protecting private property and upholding contracts. When it comes to informal economy, it can be defined as all market-based legal production of goods and services that are purposely concealed from public authorities. The main reasons of concealing are to avoid value added or other types of tax payments, to avoid payment of social security contributions and fulfilling certain administrative procedures (Schneider et al., 2010: 445).

Economic freedoms can affect the size of informal economy in five ways (Berdiev et al., 2018: 541-542):

I. Government Size
II. Price Stability related to Sound Money
III. Property Rights and Legal system
IV. The Freedom of Internationally Trading
V. Regulations about business, labor and credits.

Government size: The size of the government may influence the informal decision-making mechanism against the informal sector owing to heavy taxation. The big size of governments may characterize government overreach over heavy taxes. In this context, these taxes tempt agents on economy to go to the informal sector.

Price Stability related to Sound Money: Supporting accessing of sound money with price stability, institutions may increase the advantages of engaging in formal sector. High and volatile inflations in economies situations misguide the comparative prices of goods and services. And, in this way, it also disrupts the crucial elements of legal agreements, thereby hindering official economic activity.

Property Rights and Legal system: Including a strong law and order, the implementation of contracts and a court system, the protection of private property, the robust legal framework rises the profits of moving in formal sector. To put it another way, it rises the opportunity costs of moving into informal sector.

Freedom to trade internationally: The freedom of trading internationally encapsulates many elements of trade restrictions like the controls of exchange rate, tariffs, regulatory trade barriers, capital restrictions. These trade restrictions lure agents on economy to move into informal sector to circumvent heavy costs associated with exporting and importing artifacts. In other words, since high restrictions increase the costs to move in the official sector, these limitations could entice shadow agents to transport possibly restricted merchandise by means of using the informal sector through the activities such as smuggling.

Regulations related to credits, labor and business: The regulations related to business, credit, and labor markets is called as trade barriers. Government regulations limiting the freedom to dealing in labor markets and formal credit and tempt agents in economy to look for different ways in informal sector.
Literature Review

In the literature, the number of studies related to this particular subject is limited. The related studies are given below in chronological order.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Date Range</th>
<th>Sample Size</th>
<th>Method</th>
<th>Results / Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berdiev et. al (2018)</td>
<td>2000-2015</td>
<td>119 Countries</td>
<td>MIMIC Model</td>
<td>Economic Freedoms have negative effect on Informal Economy</td>
</tr>
<tr>
<td>Sweidan (2017)</td>
<td>2000-2007</td>
<td>112 Countries</td>
<td>GMM</td>
<td>Economic Freedoms have negative effect on Informal Economy</td>
</tr>
<tr>
<td>Elgin and Schneider (2016)</td>
<td>1999-2010</td>
<td>38 Countries</td>
<td>MIMIC Model</td>
<td>Labor Freedom Index has negative effect on Informal Economy</td>
</tr>
<tr>
<td>Schneider (2016)</td>
<td>1994-2006</td>
<td>162 Countries</td>
<td>MIMIC</td>
<td>Economic Freedoms have negative effect on Informal Economy</td>
</tr>
<tr>
<td>Medina and Schneider (2018)</td>
<td>1991-2015</td>
<td>158 Countries</td>
<td>CDA MIMIC</td>
<td>In the study, Informal Economy Index was created</td>
</tr>
<tr>
<td>Heritage Foundation (2019)</td>
<td>1995-2019</td>
<td>183 Countries</td>
<td>Equal Weight Average</td>
<td>Economic Freedom Index was created</td>
</tr>
</tbody>
</table>

Berdiev et al. (2018) studied the impact of economic freedoms over informal economy. Findings from the panel data of 119 countries between 2000 and 2015 pointed out that economic freedom had significant effect in lessening the spread of the informal economy. Furthermore, after they divided economic freedom into five key elements, the result of this study pointed out that all type of economic freedom reduced informal economic actions through the freedom of regulation causing the greatest impact in statistically significant way. In general, these findings indicated that the informal economy also yielded resistant results after considering concurrency, outliers and non-linearity. Therefore, countries aiming to deal with the spreading of informal activities might advantage from policies, supporting economic freedom.

Sweidan (2017), studied the effect of economic freedom empirically on the informal economy in 112 countries for the period of 2000 and 2007. In the study, two methods were used: fixed effect and GMM models. The findings indicated that there was a statistically significant negative relationship between economic freedom and informal economy. This result showed that the nature of the economic system played an important role in reducing the informal economy. Moreover, the results pointed out that formal and informal economies were substitutes. Political inference was in favor of the fact that economies with high share of the informal economy should work with less economic constraints.

Elgin and Schneider (2016), in 38 OECD countries, compared the levels of informal economics with their driving forces by using two different methodology. One of these methods was the multiple indicators–multiple causes (MIMIC) approach based on the estimation of the structural equation model. The other was based on the two-sector dynamic general equilibrium (DGE) model developed by Elgin and Öztunalı (2012). Labor Freedom Index was one of the variables used in the study. According to the findings, this index contributed 14.2% to the informal economies.

Schneider (2016) estimated the relationship between the informal economy and many variables in 162 countries with five different models with the MIMIC approach. Economic freedoms were one of many variables and they were included in the second model. In this model, there were 21 countries, including Eastern Europe and Central Asia (the majority of which were previously transition economies). The data period covered the years 1994-
2006. The estimation results indicated that there was a statistically significant negative relationship between the informal economy and economic freedoms in accordance with the expectations.

In addition to these studies dealing directly with the relationship between economic freedoms and informal economies, in this study, we utilized from the indices created by Medina and Schneider (2018) and Heritage Foundation (2019). Medina and Schneider (2018), in their studies, generated an annually Informal Economy Index for 158 countries by using CDA and MIMIC methods. Heritage Foundation (2019) also created Economic Freedom Index by utilizing from the data of 182 countries for the years between 1995 and 2019.

Data, Model and Method

Secondary data sources were used in the study. Descriptions of these data sets are given in the table below.

Table 2: Definition of Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Abbreviations</th>
<th>Definition of the Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal Economy</td>
<td>IE</td>
<td>Estimated Values of informal economies as percentage of GDP in the context of 158 countries over the period 1991 to 2015 using MIMIC and PMM Methodology.</td>
</tr>
<tr>
<td>Globalization Index</td>
<td>GI</td>
<td>The index measuring the economic, social and political dimensions of globalization and created by Swiss Federal Institute of Technology Zurich is presented in a scale from 1 to 100, where greater number represents a more advanced globalization.</td>
</tr>
<tr>
<td>Economic Freedom Index</td>
<td>EFI</td>
<td>The Index, created by Heritage Foundation and measuring economic freedom based on 12 quantitative and qualitative factors, grouped into four broad categories including Rule of Law, Government Size, Regulatory Efficiency, Open Markets.</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>GDP</td>
<td>Annual percentage growth rate of GDP at market prices based on constant local currency.</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>UNEM</td>
<td>Unemployment total (% of total labor force)</td>
</tr>
</tbody>
</table>

Sources:  
2. Gygli et. al. (2019)  
4. World Bank (2019), World Development Indicators.

As seen on the table 2, there are five variables in the model, four of which are independent variables commonly used for explaining informal economics in the models of previous studies (e.g. Sweidan, 2017 and Berdiev et. al. 2018).

In the study, the model is formed based on Sweidan (2017) as follows:

\[
IE_{it} = \beta_1 + \beta_2 EFI_{it} + \beta_3 GI_{it} + \beta_4 GDP_{it} + \beta_5 UNEM_{it} + \epsilon_{it},
\]

where \(IE_{it}\) denotes the values of informal economy for different countries over time. \(EFI_{it}\), \(GI_{it}\), \(GDP_{it}\) and \(UNEM_{it}\) refers to, Economic Freedom Index, Globalization Index, Annual GDP Growth and Unemployment Rates, respectively. \(\epsilon_{it}\) are error terms.
Fixed and Random Effects Methods and Hausman Statistics

The fixed effects model creates a different constant coefficient for each cross-section. According to this model, the slope coefficients do not change across units. However, the coefficients showing the constants may vary only across units or only across time units. One-way and two-way fixed effects models can be expressed as follows.

One –Way Model

\[ Y_{it} = (a_i + \mu_i) + \beta_{1it}X_{1it} + \cdots + \beta_{kit}X_{kit} + \epsilon_{it} \]

Two –Way Model

\[ Y_{it} = (a_i + \mu_i + \lambda_t) + \beta_{1it}X_{1it} + \cdots + \beta_{kit}X_{kit} + \epsilon_{it} \]

Where \( e \sim ID(0, \sigma^2_e) \). That is, it is assumed that the variance of error terms is equal to zero and is distributed independently and identically. At the same time, each \( X_{it} \) value is independent of the value of \( e_{it} \). This estimator finds different constants for each section and allows the constant coefficient to be differentiated between the cross-section units (Özer and Çiftçi, 2009: 230).

In random effect models, the random variable is generally considered as a component of the error term and added to the model. In cases where the problem of degree of freedom is not encountered, it is important to determine the average and variance of the components included in the error terms. These models are generally classified as one-way and two-way (Güriş, 2015: 22):

One –Way Model

\[ Y_{it} = a_{it} + \beta_{1it}X_{1it} + \cdots + \beta_{kit}X_{kit} + (\mu_i + \nu_{it}) \]

Two –Way Model

\[ Y_{it} = a_{it} + \beta_{1it}X_{1it} + \cdots + \beta_{kit}X_{kit} + (\mu_i + \lambda_t + \nu_{it}) \]

In the models, the error term is explained by two components. For error terms, the assumptions of \( \nu_{it} \sim ID(0, \sigma^2_{\nu}) \) and \( \nu_{it} \sim ID(0, \sigma^2_{\nu}) \) are applied (Özer ve Çiftçi, 2009: 230).

With the tests performed, if it is ascertained that there are unit and/or time effects, it should be decided whether these effects are fixed or random. In this context, the Hausman (1978) specification test for the identification error is used to determine the estimators in the panel data models.

**H₀ Null Hypothesis:** There is no correlation between explanatory variables and unit (specific) effect. In this case, it is expected that the difference between the estimators of fixed and random effects will be very small because both estimators are consistent. In this case, it will be appropriate to use the estimator of random effects.

**H₁ Alternative Hypothesis:** There is a correlation between explanatory variables and unit (specific) effect. In this case, the estimation of the random effects should be deviated and the difference between the estimators is expected to be large. Therefore, fixed effects should be preferred (Uluyol and Türk, 2013: 377).

Analysis Result

In this part of the study, firstly, summary statistics about the variables are given. Then, pairwise correlations amongst variables are examined. Finally, the relationship between informal economy and economic freedoms is estimated by using estimators of Fixed Effects and Random Effects, and the results are interpreted.

Summary statistics for the variables used in the model are given in the table below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE</td>
<td>765</td>
<td>33.17408</td>
<td>10.26829</td>
<td>12.15</td>
<td>63.47</td>
</tr>
<tr>
<td>EFI</td>
<td>760</td>
<td>56.27053</td>
<td>7.307865</td>
<td>31.5</td>
<td>77.7</td>
</tr>
<tr>
<td>GI</td>
<td>748</td>
<td>50.99323</td>
<td>11.90884</td>
<td>24.39283</td>
<td>79.16003</td>
</tr>
<tr>
<td>GDP</td>
<td>762</td>
<td>4.779372</td>
<td>6.720615</td>
<td>-62.077592</td>
<td>123.1396</td>
</tr>
<tr>
<td>UNEM</td>
<td>765</td>
<td>7.949235</td>
<td>5.539685</td>
<td>0.16</td>
<td>29.77</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.
In the Table 4, pairwise correlations for the variables are presented.

<table>
<thead>
<tr>
<th>Variable</th>
<th>IE</th>
<th>EFI</th>
<th>GI</th>
<th>GDP</th>
<th>UNEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE</td>
<td>1.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EFI</td>
<td>-0.3560*</td>
<td>1.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GI</td>
<td>-0.5137*</td>
<td>0.7089*</td>
<td>1.000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.0088</td>
<td>-0.0172</td>
<td>0.0105</td>
<td>1.000</td>
<td>-</td>
</tr>
<tr>
<td>UNEM</td>
<td>0.0516</td>
<td>-0.2575*</td>
<td>-0.1310*</td>
<td>-0.0314</td>
<td>1.000</td>
</tr>
</tbody>
</table>

As seen on Table 4, The IE variable is statistically significant and positively related to EFI. The dependent variable IE has positive relationship with GI and GDP, and the variable UNEM is negatively correlated with UNEM, as expected. In addition, it is observed that the independent variables are not highly correlated.

Table 5: Fixed Effects and Random Effects Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed Effects</th>
<th>Random Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFI</td>
<td>-0.1330***</td>
<td>-0.1386***</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>GI</td>
<td>-0.4937***</td>
<td>-0.4965***</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.0496***</td>
<td>-0.0502***</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>UNEM</td>
<td>0.3646***</td>
<td>0.3844***</td>
</tr>
<tr>
<td></td>
<td>(0.056)</td>
<td>(0.057)</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>63.0263***</td>
<td>63.4006***</td>
</tr>
<tr>
<td></td>
<td>(2.479)</td>
<td>(2.121)</td>
</tr>
</tbody>
</table>

Observations: 740
The Number of Groups: 44
F Statistics: 150.53***
R-Squared: 0.2268

Hausman Null Hypothesis: Difference in coefficients not systematic
Hausman Test Statistic: $\text{chi2(4)} = (b-B)^T[(V_b-V_B)^{-1}](b-B) = 5.86^*$ Prob: 0.21

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

In all models, all coefficients are statistically significant at 1% level. According to both models, one-point increase in EFI leads to a nearly 0.13% reduction in the size of IE. One-point increase in Globalization Index causes a 0.49% reduction in the size of informal economy. %1 increase in GDP Growth also generates an approximately 0.05% reduction in the size of informal economy in these models. Lastly, unemployment rates also raise the informal economy. 1% increase in Unemployment Rates leads to a nearly 0.37% increase in the size of informal economy.
F statistics values are also statistically significant at %1 level, meaning that the coefficient of models is significant as a whole. For two models, the R squared value indicates that nearly 22% of the changes in dependent variables are explained by changes in independent variables. As for Hausman Test, the probability value of the test score indicates the probability of failure when we reject the null hypothesis. Since it is bigger than %5, it indicates that the difference in coefficients is not systematic and random effects (RE) is a valid model in this case. Due to the heteroscedasticity problem in the model, RE model is estimated with robust standard errors and Driscoll-Kraay Standard Errors. The results are presented in Table 6 below.

Table 6: Random Effects Results
Dependent Variable: Informal Economy (IE)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Random Effects With Robust Standard Errors</th>
<th>Random Effects with Driscoll-Kraay Standard Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFI</td>
<td>-0.1330** (0.062)</td>
<td>-0.1330*** (0.029)</td>
</tr>
<tr>
<td>GI</td>
<td>-0.4937*** (0.068)</td>
<td>-0.4937*** (0.032)</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.0496** (0.022)</td>
<td>-0.0496** (0.023)</td>
</tr>
<tr>
<td>UNEM</td>
<td>0.3646*** (0.099)</td>
<td>0.3646*** (0.040)</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>63.0263*** (4.614)</td>
<td>63.0263*** (3.637)</td>
</tr>
</tbody>
</table>

Observations 740 740
The Number of Groups 44 44
F Statistics 123.68*** 1578.94***
R -Squared 0.2288 0.2288

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

As seen on Table 6, all coefficients have the same signs and values as in the previous table, except for the coefficients of standard errors. Furthermore, the coefficients of GDP are statistically significant at %5 level now. Comments would be similar to the ones made on previous results.

Conclusion and Evaluation

The reduction and ultimately the elimination of the informal economy emerges as an important problem for the countries in terms of effectively collecting tax revenues, preventing unfair competition and increasing confidence in the state. In this context, increasing economic freedoms contributes to the reduction of such economic activities. In this study, the effect of economic freedoms on the informal economy is examined through Fixed Effects and Random Effects Models for 44 OIC countries for the period of 1999-2015. The findings obtained show that there is statistically significant and negative relationship between economic freedoms and informal economy. According to findings, one-point increase in Economic Freedom Index leads to a 0.1330% reduction in the size of informal economy. These results are similar to the studies of Berdiev et. al (2018), Osama (2017), Elgin and Schneider (2016) and Schneider (2016). This result indicates that OIC member
countries, mostly developing countries, have to liberalize their economies and have more open economies in order to have less informal economies, and so to reach the level of developed countries. The study shows that having more economic freedoms in OIC countries will contribute to the economic growth of them in the long term. Further studies are required for more in-dept investigation of the relationship between the sub-indices of the economic freedom index and the informal economy.

References


The Relationship Between Health Expenditures and Life Expectancy in D-8 Countries: A Panel Data Analysis

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Abstract

In recent years, the technological developments in the field of health, better nutrition conditions and the increase in the quality of public health services have increased the life expectancy of people. Access to health services has been facilitated through the integration of countries. In addition, the contribution of the scientific studies and the R&D expenditures in the field of health has been high in the prolongation of life. In this study, the effect of health expenditures on life expectancy in D-8 countries for the period of 2000-2015 is analyzed by using panel data methods. The findings indicate that; health expenditures, per capita income, high technology exports and food index increase the life expectancy.

Keywords: Health Expenditures, Life Expectancy, Panel Data analysis, D-8 Countries.

Introduction

The indicators regarding to the level of income, education and health in a country provide insight about the level of development of that country. Health has a particular importance in development economics due to its impacts on quality of education and productivity of labor (Tüylüoğlu ve Tekin, 2009: 1). Health, one of the main concerns of all societies, also occupies an important share on state budgets. As countries gets richer, the share of health expenditures in GDP rises, and so life expectancy increases, as well. The fact that individuals are healthy and long-lived has positive effects on production and economic growth. As a matter of fact, the average life expectancy in developed countries reaches to 85 years of age, while this duration falls below 50 years in underdeveloped countries. In the field of health, in order to make enough expenditure in many areas including R & D, the increase in per capita income is extremely important. However, a significant number of people, let alone spending enough for health, cannot even access to clean water, one of the most basic needs. Although the United Nations (UN) has set some targets within the scope of the Millennium Development Goals, it is clear that there is not much progress made in the current situation and there is a lot of work to be done on this issue.

In this study, the relationship between health spending and life expectancy in D-8 countries, founded under the leadership of Turkey with other 7 Muslim member states, are analyzed with panel data method using data for the years between 2000 and 2015. After a series of preparatory meetings following the "International Development Cooperation" on October 22, 1996, the establishment of the D-8 was officially announced at the summit of Heads of State and Government in Istanbul on June 15, 1997. D-8 countries consist of Turkey, Indonesia, Bangladesh, Pakistan, Egypt, Iran, Malaysia and Nigeria. The six stars symbolizing the 6 basic principles in the flag of the D-8 have the following meanings: not war, peace; not conflict, dialogue; not double standard, justice; not superiority, equality; not exploitation but just order; not oppression and domination but human rights, freedom and democracy. The countries within the D-8 are also members of the Islamic Cooperation
Organization. Due to their natural resources, crowded populations and potential markets, D-8 member states have an important position in their regions. The cooperation under D-8 is mainly carried out on a sectoral basis. In this context: Turkey coordinates industry, health and environment issues; Bangladesh coordinates rural development issues; Indonesia coordinates fighting against poverty and human resources issues; Iran coordinates science and technology issues, Malaysia coordinates finance, banking and privatization issues; Egypt coordinates trade issues; Nigeria coordinates energy issues and Pakistan coordinates agriculture and fishery issues1 However, considering the progress made so far, it is far behind the targets in many areas.

The reviews of the literature regarding health expenditures and life expectancy are as follows:

Kararsoy ve Demirtaş (2018) examined the determinants of health expenditures by taking into account the data of 2000-2015 period for selected 27 OECD countries. In the study, four econometric models with one dependent and five independent variables were estimated by using panel data analysis. One of the findings obtained in the study where of the average life expectancy was included as one of the determinants was that health expenditures increased as the average life expectancy increased. According to the results, the increase in life expectancy in the OECD countries leads to increased healthcare costs by raising health-related needs.

Şahbudak and Sahin (2015) analyzed the relationship between health indicators and economic growth in the BRIC countries with panel data method. In the model, GDP as a dependent variable, the share of health expenditures in GDP and life expectancy at birth as independent variables were used. According to the findings, a positive relationship was found between the share of health expenditures in GDP, life expectancy at birth and economic growth.

Jaba et al. (2014) analyzed the relationship between the outcomes of health care systems and their dynamics. As health care input, health service expenditures per capita in current US Dollar, and life expectancy variables in the year were used as the output of health care systems. To this aim, for the years between 1995 and 2010, grouped geographical data of 175 countries according to the world health organization classification, their income level according to world bank classification were used. In this study, panel data analysis was used to estimate life expectancy as a function of health expenditures. The findings obtained pointed out a significant relationship between health expenditures and life expectancy. In the study, it was also revealed that country effects were significant and there were significant differences between countries.

Bayati et al. (2013) predicted a health production function. In this context, economic, social and environmental factors affecting the life expectancy at birth for the period of 1995-2007 in the countries of the Eastern Mediterranean Region were examined. Except for health expenditures, the effect of economic factors on life expectancy at birth was estimated positive. Health expenditures were considered as a measure of the provision of health facilities for the community. In this study, an insignificant relationship was found between health expenditures and life expectancy at birth. It was believed that high health expenditures in this region were related to high user fees. Therefore, due to the increase in health expenditures, the positive impact of health facility services was offset by the decrease in financial access.

Tüylioğlu and Tekin, (2009) examined the explanatoriness of economic indicators on health indicators for 176 countries in 2003 by using multiple regression analysis. The results of analysis indicated that the health expenditures had more influence on life expectancy and infant mortality rates than the income level. Thus, the authors pointed out that increasing solely the level of income was not sufficient for prolongation of life expectancy, which was in line with the arguments of development economics.

Nixon and Ulmann (2006) emphasized that the relationship between health care expenditures and health outcomes attracted the interest of policy-makers in light of the continuous increases in health expenditures for most industrialized countries, but stressed that the establishment of causal relationships was complex in a number of ways. Firstly, it was stated that health expenditures were only one of many quantitative and qualitative factors that contributed to health outcomes, and secondly, it was a difficult process to measure health status. This study reviewed the main findings and methodological approaches in this field and presented the

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1 For detailed information about D8, please see [http://developing8.org/](http://developing8.org/)
results of empirical studies on European Union countries. In the study, life expectancy and infant mortality were examined as 'output' of health care system and various lifestyle, environmental and occupational factors as 'input'. For this purpose, econometric analyzes were made by using the fixed effects model on the panel data for the former 15 members of the European Union for 1980-1995 period. The findings pointed out that the increase in health expenditures was significantly related to the serious improvements in infant mortality, but slightly related to life expectancy.

2. Descriptive Analysis

The development of per capita health expenditures and life expectancy in D-8 countries are shown in Graph 1. Countries with the highest per capita health expenditure are; Turkey, Malaysia and Iran. In 2015, the health expenditure per capita was about $31 in Bangladesh, and $37 in Pakistan. Countries with the longest life expectancy at birth are Turkey, Malaysia and Iran. Life expectancy at birth in 2015 was approximately 75 years in these countries.

Graph 1: The Development of Health Expenditures and Life Expectancy


Graph 2 shows the food index and per capita income growth. The food index in D-8 countries increased remarkably in the period of 2000-2015. Countries with the highest per capita income are Malaysia, Turkey and Iran. In the period of 2000-2015, the countries with the highest increase in per capita income were Nigeria with 4.8% and Indonesia with 4.2%.
Among the D-8 countries, Malaysia had the highest level of high technology exports. Malaysia was followed by Indonesia and Turkey. According to figures for 2015, high-tech exports were about 57 billion dollars in Malaysia while that was realized approximately $2 billion in Turkey (See Graph 3).

Graph 3: The Development of High Technology Exports

Source: WorldBank, World Development Indicators,
Econometric Analysis

The variables used in the analysis of the effects of health expenditures on life expectancy at birth in D-8 countries are presented in Table 1. The life expectancy at birth was determined as dependent variable, health expenditures per capita, GDP per capita, food production index and high technology export variables were determined as explanatory variables. In this study, it was tried to be differentiated from other studies in terms of the samples and variables used. All variables were used in logarithmic form. Two different models were estimated by using Fixed Effects (FE), Random Effects (RE) and Pooled Least Squares (POLS) estimators. The models to be estimated are as follows:

\[
\begin{align*}
\text{LNLIFE}_{it} &= a + \text{LNHEALTH}_{it} + \text{LNFOOD}_{it} + \text{LNHTECH}_{it} + \varepsilon_{it} \quad \text{Model (1)} \\
\text{LNLIFE}_{it} &= a + \text{LNGDPPER}_{it} + \text{LNFOOD}_{it} + \text{LNHTECH}_{it} + \varepsilon_{it} \quad \text{Model (2)}
\end{align*}
\]

Table 1: Data Set

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Expenditures Per Capita</td>
<td>Health expenditures per capita in the health sector in terms of current US dollars. Health expenditures consist of health products and services consumed each year.</td>
</tr>
<tr>
<td>(LNHEALTH)</td>
<td></td>
</tr>
<tr>
<td>Life Expectancy at Birth</td>
<td>The life expectancy at birth shows the number of years a newborn baby will live if the death patterns at the time of birth remain the same throughout his life.</td>
</tr>
<tr>
<td>(LNLIFE)</td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>GDP per capita data is obtained by dividing GDP by population. Data are in current US dollars.</td>
</tr>
<tr>
<td>(LNGDPPER)</td>
<td></td>
</tr>
<tr>
<td>Food Production Index</td>
<td>Food production index includes food products that are considered edible and contain nutrients. Although these products are edible, there is no nutritious value, so there is no coffee and tea.</td>
</tr>
<tr>
<td>(LNFOOD)</td>
<td></td>
</tr>
<tr>
<td>High Technology Exports</td>
<td>The production of high technology covers products manufactured with high R&amp;D expenditures. Aviation, computers, pharmaceuticals, scientific equipment and electrical machines are considered as high technology products. Data are in current US dollars.</td>
</tr>
<tr>
<td>(LNHTECH)</td>
<td></td>
</tr>
</tbody>
</table>


The major attraction of the FE and RE estimators is that they control all non-measured (or latent) variables that change over time that affect the dependent variable. This is a great advantage given the possible presence of such omitted variables (Bollen and Brand, 2010). In the RE estimator, the individual-specific effect is a random variable that is not correlated with the explanatory variable, whereas it is correlated with the explanatory variable in the FE model (Schmidheiny, 2018: 3–4). The RE estimator, which has a higher efficiency advantage than FE, provides higher statistical power to detect smaller standard coefficient errors and effects (Bollen and Brand, 2010). In the FE estimator, dummies are seen as part of the constant term. This estimator examines the group differences in the constant term and assumes that the slope coefficients between the units are the same and that the constant variance is valid between these units. In the RE estimator, dummies serve as the error term. This estimator estimates the components of variance by assuming the same intercepts and slope coefficients for groups and error terms. The difference between groups (or time periods) arises from the variance of error terms, not from the difference in constant term (people.tamu.edu). The Hausman (1978) test is useful for determining which of these models are more effective (Bollen and Brand, 2010).

Descriptive statistics for the variables are given in Table 2. According to skewness values; LNLIFE, LNHEALTH and LNFOOD variables are on the left, LNGDPPER and LNHTECH variables are skewed to the right. In terms of kurtosis values, it can be said that only the kurtosis value of the LIFE variable is greater than 3, which means that it is pointed to normal distribution.
Table 2: Descriptive Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>LNLIFE</th>
<th>LNHEALTH</th>
<th>LNOOD</th>
<th>LNGDPPER</th>
<th>LNHTECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.206636</td>
<td>4.295316</td>
<td>4.658898</td>
<td>7.657612</td>
<td>19.71705</td>
</tr>
<tr>
<td>Median</td>
<td>4.238618</td>
<td>4.384989</td>
<td>4.658427</td>
<td>7.606510</td>
<td>19.23960</td>
</tr>
<tr>
<td>Minimum</td>
<td>3.834407</td>
<td>2.093320</td>
<td>4.351696</td>
<td>5.992997</td>
<td>12.22860</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.118543</td>
<td>1.187441</td>
<td>0.158611</td>
<td>0.977970</td>
<td>2.957999</td>
</tr>
<tr>
<td>Skewness</td>
<td>-1.882316</td>
<td>-0.005190</td>
<td>-0.018759</td>
<td>0.151047</td>
<td>0.137418</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>5.715606</td>
<td>1.956078</td>
<td>2.062370</td>
<td>1.970243</td>
<td>2.360445</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>105.0415</td>
<td>5.313170</td>
<td>4.292717</td>
<td>5.614346</td>
<td>2.362256</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td>0.070188</td>
<td>0.116909</td>
<td>0.060375</td>
<td>0.306932</td>
</tr>
<tr>
<td>Sum</td>
<td>492.1764</td>
<td>545.0911</td>
<td>895.9406</td>
<td>2306.895</td>
<td>1014.972</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>1.630088</td>
<td>163.5618</td>
<td>2.918270</td>
<td>110.9453</td>
<td>2306.895</td>
</tr>
<tr>
<td>Observations</td>
<td>117</td>
<td>117</td>
<td>117</td>
<td>117</td>
<td>117</td>
</tr>
</tbody>
</table>

Table 3 presents the findings of the models obtained to test the relationship between health expenditures and life expectancy. To determine which of the estimators (FE, RE and POLS) used in the estimation of the models give more effective results; F, LM and Hausman tests were performed. In the first model, while the Hausman test statistic value was not statistically significant, the coefficients of F and LM tests were significant. The fact that both F and LM tests are significant means that FE or RE estimators can be used, but among these estimators, the Hausman test is needed to determine which results are more effective. Since the Hausman test statistical value is not significant, it can be stated that RE estimator gives more effective results. The same results apply to the second model, as well.

Table 3: Results of FE, RE and POLS Estimators

<table>
<thead>
<tr>
<th>Dependent Variable: LNLIFE</th>
<th>FE (MODEL 1)</th>
<th>RE (MODEL 1)</th>
<th>POLS (MODEL 1)</th>
<th>FE (MODEL 2)</th>
<th>RE (MODEL 2)</th>
<th>POLS (MODEL 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNFOOD</td>
<td>0.0448***</td>
<td>0.0444***</td>
<td>0.0562</td>
<td>0.0334**</td>
<td>0.0332**</td>
<td>0.0606</td>
</tr>
<tr>
<td></td>
<td>(0.0133)</td>
<td>(0.0131)</td>
<td>(0.0618)</td>
<td>(0.0139)</td>
<td>(0.0137)</td>
<td>(0.0633)</td>
</tr>
<tr>
<td>LNHEALTH</td>
<td>0.0135***</td>
<td>0.0136***</td>
<td>0.0194**</td>
<td>0.00419</td>
<td>0.00413</td>
<td>0.00928</td>
</tr>
<tr>
<td></td>
<td>(0.00419)</td>
<td>(0.00413)</td>
<td>(0.00928)</td>
<td>(0.00413)</td>
<td>(0.00413)</td>
<td>(0.00928)</td>
</tr>
<tr>
<td>LNHTECH</td>
<td>0.00898***</td>
<td>0.00902***</td>
<td>0.0165**</td>
<td>0.00807***</td>
<td>0.00811***</td>
<td>0.0173***</td>
</tr>
<tr>
<td></td>
<td>(0.00127)</td>
<td>(0.00125)</td>
<td>(0.00376)</td>
<td>(0.00131)</td>
<td>(0.00129)</td>
<td>(0.00423)</td>
</tr>
<tr>
<td>LNGDPPER</td>
<td></td>
<td></td>
<td></td>
<td>0.0206***</td>
<td>0.0206***</td>
<td>0.0154</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.00520)</td>
<td>(0.00513)</td>
<td>(0.0129)</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>3.763***</td>
<td>3.762***</td>
<td>3.536***</td>
<td>3.734***</td>
<td>3.732***</td>
<td>3.465***</td>
</tr>
<tr>
<td></td>
<td>(0.0519)</td>
<td>(0.0697)</td>
<td>(0.276)</td>
<td>(0.0396)</td>
<td>(0.0631)</td>
<td>(0.277)</td>
</tr>
<tr>
<td>Hausman Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
</tr>
<tr>
<td>F test</td>
<td>1513.13***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1624.59***</td>
</tr>
<tr>
<td>LM test</td>
<td></td>
<td>609.37***</td>
<td></td>
<td></td>
<td></td>
<td>612.78***</td>
</tr>
<tr>
<td>Observations</td>
<td>117</td>
<td>117</td>
<td>117</td>
<td>117</td>
<td>117</td>
<td>117</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.819</td>
<td>0.328</td>
<td>0.827</td>
<td>0.310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of crossid</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
After determining the estimator with the Hausman test, the heteroscedasticity and autocorrelation tests were performed to determine whether the findings of this estimator were reliable or not (Table 4). According to the results of the autocorrelation tests, there is a serial correlation between the successive values of the error terms in both models. All forms of the Levene, Brown and Forsythe heteroscedasticity test except for W50, clearly reject the hypothesis of homoskedasticity across country. Therefore, the heteroscedasticity problem appears in both models.

<table>
<thead>
<tr>
<th>Diagnotistics Tests</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Otokorelasyon testleri</td>
<td>modified Bhargava et al. Durbin-Watson = .55301663</td>
<td>modified Bhargava et al. Durbin-Watson= .47965537</td>
</tr>
<tr>
<td></td>
<td>Baltagi-Wu LBI = .94588297</td>
<td>Baltagi-Wu LBI = .84468041</td>
</tr>
<tr>
<td>Heteroscedasticity Tests (Levene, Brown and Forsythe)</td>
<td>W0 = 3.4869538, Pr &gt; F = 0.00206643</td>
<td>W0 = 3.4963068, Pr &gt; F = 0.00202183</td>
</tr>
<tr>
<td></td>
<td>W50 = 1.5700472, Pr &gt; F = 0.15189556</td>
<td>W50 = 1.6270598, Pr &gt; F = 0.13527148</td>
</tr>
<tr>
<td></td>
<td>W10 = 3.0247619, Pr &gt; F = 0.00605605</td>
<td>W10 = 3.0622259, Pr &gt; F = 0.00555234</td>
</tr>
</tbody>
</table>

Models were re-estimated using Driscoll-Kraay standard errors which took the heteroscedasticity and autocorrelation problems into account. According to the results of the first model in Table 5, an increase of 1% in health expenditures, food index and high technology exports increases life expectancy by approximately 0.03, 0.04 and 0.009, respectively. According to the findings of the second model, a 1% increase in GDP per capita will increase the life expectancy by 0.02 percent. In this model, as in the first model, food index and high technology exports are also significant. The findings are consistent with economic expectations.

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLE: LNLIFE</th>
<th>(MODEL 1)</th>
<th>(MODEL 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIABLES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNFOOD</td>
<td>0.0444**</td>
<td>0.0332*</td>
</tr>
<tr>
<td>(0.0201)</td>
<td>(0.0174)</td>
<td></td>
</tr>
<tr>
<td>LNHEALTH</td>
<td>0.0136***</td>
<td></td>
</tr>
<tr>
<td>(0.00451)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNHTECH</td>
<td>0.00902***</td>
<td>0.00811***</td>
</tr>
<tr>
<td>(0.00202)</td>
<td>(0.00208)</td>
<td></td>
</tr>
<tr>
<td>LNGDPPER</td>
<td>0.0206***</td>
<td></td>
</tr>
<tr>
<td>(0.00474)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTANT</td>
<td>3.762***</td>
<td>3.732***</td>
</tr>
<tr>
<td>(0.0656)</td>
<td>(0.0437)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>117</td>
<td>117</td>
</tr>
<tr>
<td>Number of groups</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Driscoll and Kraay Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Conclusion
In this study, the effects of health expenditures on life expectancy in D-8 countries were investigated using FE, RE and POLS estimators. In addition, the control variables that we thought would have an impact on the life expectancy were also used. These variables were GDP per capita income, food index and high technology exports. According to the findings obtained from the study; increase in health expenditures, GDP per capita, food
index and high technology exports positively affected life expectancy at birth. As a matter of fact, life expectancy at birth is higher in developed countries than in developing and underdeveloped countries. For example, life expectancy at birth is 84 years in Japan, while it is 75 years in Turkey and Malaysia, countries with the highest value amongst D-8 countries. From the point of increasing the life expectancy to the level of developed countries; D-8 countries should reform health sector and increase the investments and accelerate R&D activities in the field of health. Moreover, D-8 countries should cooperate/collaborate on R&D activities, health care and technology transfer issues.

References


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