



INTERNATIONAL ACADEMIC INSTITUTE

IAI ACADEMIC CONFERENCE PROCEEDINGS

International Virtual Academic Conference

**Education and Social Sciences
Business and Economics**

11 November 2020

IAI Academic Conference Proceedings

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ISSN 2671-3179

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Open-source system for generation, optical recognition and assessment of written exams

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Abstract

A system for generation, optical recognition and automatic assessment of written exams is presented. It was implemented and is in use at the Faculty of Health Sciences, University of Ljubljana, since 2018. The system was developed and is maintained on the basis of our own knowledge and experience. User (*e.g.* teacher) interacts with system through a web interface. The system has its own markup language to construct the problems. A unique problem sheet of multiple-choice questions is created for each student. Even if we use the same set of questions for all students, it shuffles the order of questions and provided answer possibilities for each exam. Before the written exam, problem sheets are printed and distributed among students. After the examination, filled sheets are scanned and their images are sent to the server. The server evaluates the answers and links them with students. If allowed, the students can see their assessed exams online and submit possible complaints. The protection of personal data is taken care off. Students response was positive, they prefer the objectivity and fast feedback. The faculty staff welcomed the decrease of cheating and the time saved with automatic assessment of the exams. What remains open is a broader systematic implementation. All the software is open source, which means that it is freely accessible to everyone to use, develop and further implementation. We describe the whole process from the generation of questions to the assessment and publication of students' results, as well as our practical experience with the system at the faculty.

Keywords: automation, higher education, LaTeX, python, web interface.

1. Introduction

Written exams in higher education often provide students with the first systematic feedback on the quality of their knowledge. As such they have to be implemented by the highest possible pedagogical standards (Ramsden, 2003; Henderson *et al*, 2011; Kane *et al*, 2002; Kember *et al*, 2000). However, such written exams are often events with hundreds of participants. All this calls for a high degree of systematization and objectiveness for such mass exams.

In this work we present an information technology system for generation, optical recognition and automatic assessment of written exams that was implemented and is in use at the Faculty of Health Sciences, University of Ljubljana, Slovenia. The system was built on the ideas of the existing solutions (Kortemeyer *et al*, 2008; Rane *et al*, 2009; Fisteus *et al*, 2013) and based on the authors' many years of experience with the development and use of a similar system (Berkopec *et al*, 2008; Penič *et al*, 2019). Despite the presence of similar solutions, the system was composed and coded completely anew and adapted to the needs of the Faculty of Health Sciences, University of Ljubljana, Slovenia.

The system allows the user to define the problems, and can create for each student a unique problem sheet of multiple-choice questions. Even if the same set of questions is used for all students, it shuffles the order of questions and possible answers for each exam. Problem sheets are then printed and distributed among students. After the examination, filled sheets are scanned and their images are sent to the server. The server evaluates the answers and links them with appropriate students. If allowed, the students can see their assessed exams online and submit possible complaints. The protection of personal data is taken care off.

All the software of the system is open-sourced, which means it is freely accessible for use, further development and implementation or integration with other solutions (Penič, 2019a, b, c).

Below we present the structure of the system, open-source solutions used, the whole written exam workflow and our experience with the system in practical use at the Faculty of Health Sciences, University of Ljubljana, Slovenia.

2. Structure and workflow

Web interface (front end of the system) and server application (back end of the system) are connected by the data base (Figure 1). In our implementation the open-sourced SQL database postgresql was used, but other data bases can be taken instead. Web interface and server application are written in the python programming language.

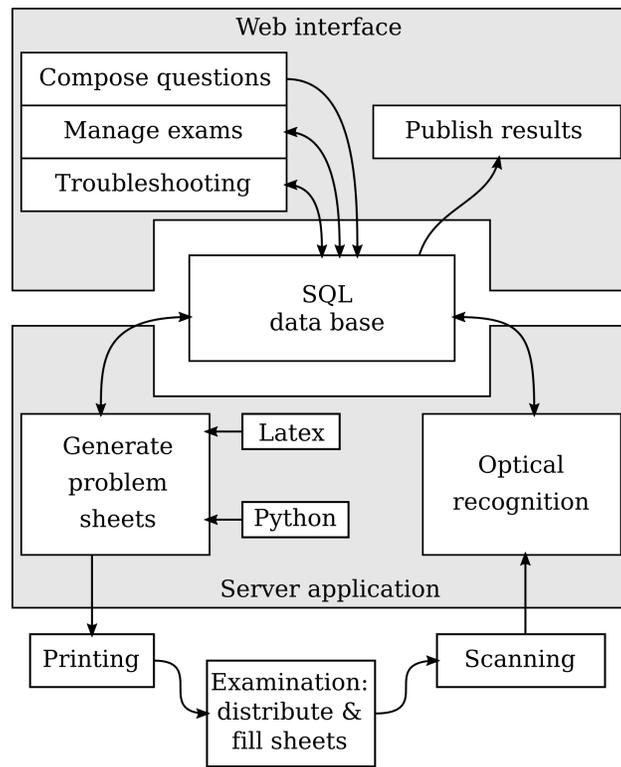


Figure 1. System structure diagram.

Written exam workflow starts with constructing the problems and opening and defining the new written exam. Written exams are composed and edited using the web interface (Figure 2), where for all communication a safe HTTPS protocol is used. Web page is built in the Django 2.2 web framework, which allows easy communication with the database in the background and offers a clean and pragmatic design in the foreground.

Every problem is a separate text file. The system uses its own markup language where besides the text of the problem also the design of the text and all the given answers are defined.

Problem text files are part of the database and can be revoked for multiple exams. When the whole structure of the exam, including all the problems, is defined, the generation of unique problem sheets can be called.

Problem sheets generator is an application running on the server (Figure 1). When a request for problem sheets generation is called, the parser scans the problem text files, creates the values of the input parameters for problems on each problem sheet separately and calculates the results. For numerical and symbolic calculations numpy and sympy libraries are used, respectively. For all problem sheets a single LaTeX file is generated using a customizable design template. This LaTeX file is finally compiled into a PDF file. This single PDF file, containing all the problem sheets, can then be printed and distributed among students (Figure 3).

After the exam, the exam sheets filled out by students are collected and sent through the scanner. The scanner is programmed to send each scanned page of the problem sheet to the system server as a TIFF image file (Figure 1). For this submission different transfer protocols are available, but usually File Transfer Protocol (FTP) is used.

The server then does optical recognition on the received images, connects pages of the problem sheets to appropriate students, connects students with their data from the students database and evaluates the exam.

For optical character recognition the OpenCV library is used (using python wrappers). For QR code recognition pyzbar library is used. If needed, students' handwritten numbers are recognized using neural networks defined in the sklearn library.

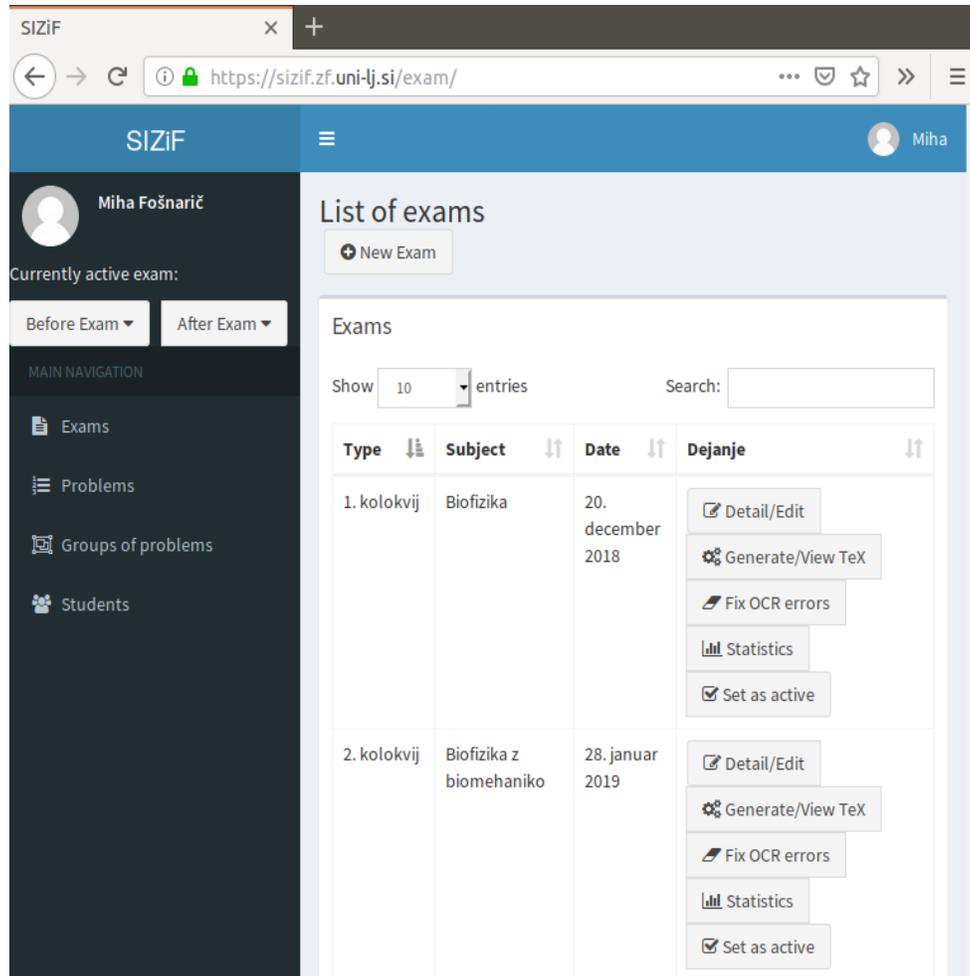


Figure 2. Screenshot of the web interface.

The graphical elements on the problem sheet (Figure 3) that are used in the optical recognition process are:

- QR code (top left corner) is used to connect the scanned page with its values in the database, especially with the matrix of correct answers. Optionally QR code can also contain unique identification number of the student, through which students name and other information can be revoked from the database.
- If unique identification number of the student is not contained in the QR code (optional), it is obtained from the fields especially designed for the purpose to be manually entered by the student (top right corner).
- Black boxes in the top and in the right margins define the coordinates of the available answers. The students color the chosen answers in “black” and this is optically recognized by the system.

Result of the optical recognition process are saved in the database, together with references to the images of the pages, which are saved on the disc as PNG files, ready to be accessed by web browsers.

Evaluated exams can be examined on the troubleshooting pages, where authorized personnel can access results (marks) and PNG images of problem sheets for each student. This pages offer also statistical analyses (Figure 4) and options to export students' results as data sheets (for example in csv format).

Part of the system are also web pages, where students can see their evaluated written exams, with wrong and correct answers marked graphically on the images of their problem sheets (optional). Here students can file complaints or inquire about the problems. This can completely replace the physical contact for student-teacher troubleshooting.

For security purposes, the server of the system is installed on a hardware that is located inside the facilities of the Faculty of Health Sciences, University of Ljubljana, Slovenia. Hardware requirements for the system are very low. Separate components of software have been checked on open-source GNU/Linux distributions. For installation only Linux operating system and python libraries are needed. For easier installation a configuration file for virtualization is prepared to create a Docker image.



Ime in priimek:

Zdravstvena fakulteta

Vpisna št.: 11800388

Izpit iz predmeta Biofizika z biomehaniko (Fizioterapija) 28. 01. 2019

1. Pri fizioterapiji z elektromagnetnim valovanjem se v atomu pacientovega telesa absorbira foton. Pri tem se poveča energija atoma za $1,0 \cdot 10^{-19} \text{ J}$.

a) Kakšna je valovna dolžina elektromagnetnega valovanja?

(A) $\lambda = 1990 \text{ nm}$ (B) $\lambda = 39,8 \text{ nm}$ (C) $\lambda = 2630 \text{ nm}$ (D) $\lambda = 4180 \text{ nm}$ ■

b) Koliko takšnih fotonov odda vir elektromagnetnega valovanja vsako sekundo, če seva energijski tok $25,0 \text{ W}$?

(A) $N/t = 1,60 \cdot 10^{20} / \text{s}$ (B) $N/t = 2,50 \cdot 10^{20} / \text{s}$ (C) $N/t = 3,30 \cdot 10^{20} / \text{s}$ (D) $N/t = 2,82 \cdot 10^{20} / \text{s}$ ■

2. Pri fizioterapiji z ultrazvokom se v gramu pacientovega tkiva absorbira $3,5 \text{ J}$ energije. Za koliko se pri tem segreje tkivo, če je specifična toplota tkiva $3450 \text{ J}/(\text{kg K})$? Oddajanje toplote okolnemu tkivu zanemarimo.

(A) $\Delta T = 0,83 \text{ }^\circ\text{C}$ (B) $\Delta T = 1,0 \text{ }^\circ\text{C}$ (C) $\Delta T = 1,2 \text{ }^\circ\text{C}$ (D) $\Delta T = 2,1 \text{ }^\circ\text{C}$ ■

3. Potapljač na vdih se potopi na globino $9,0 \text{ m}$. Gostota vode je $1000 \text{ kg}/\text{m}^3$, nad gladino pa je zračni tlak 1 bar .

a) Za koliko se med potopom spremeni prostornina njegovih pljuč, če se zrak v pljučih stiska kot idealni plin?

(A) $\Delta V/V = -58 \%$ (B) $\Delta V/V = -47 \%$ (C) $\Delta V/V = -98 \%$ (D) $\Delta V/V = -84 \%$ ■

b) Kolikšen je vzgon na potapljača, če je njegova prostornina $7,5 \text{ dm}^3$?

(A) $F_v = 22 \text{ N}$ (B) $F_v = 120 \text{ N}$ (C) $F_v = 74 \text{ N}$ (D) $F_v = 110 \text{ N}$ ■

4. Smučar stoji na klancu z nagibom 12° . Ko postavi smučī vzdolž klanca, začne drseti, ne da bi se pogнал.

a) Največ kolikšen je koeficient lepenja med smučī in podlago?

(A) $k_l^{(max)} = 0,45$ (B) $k_l^{(max)} = 0,30$ (C) $k_l^{(max)} = 0,38$ (D) $k_l^{(max)} = 0,21$ ■

b) Kakšen je pospešek smučarja, dokler je njegova hitrost tako majhna, da lahko zračni upor zanemarimo? Koeficient trenja med smučī in podlago je $0,12$.

(A) $a = 2,4 \text{ m}/\text{s}^2$ (B) $a = 0,52 \text{ m}/\text{s}^2$ (C) $a = 1,3 \text{ m}/\text{s}^2$ (D) $a = 0,89 \text{ m}/\text{s}^2$ ■

c) Koliko energije se porabi za trenje med smučī in podlago, ko smučar predrsi razdaljo 50 m , če je njegova masa 85 kg ?

(A) $W_t = 13 \text{ kJ}$ (B) $W_t = 7,0 \text{ kJ}$ (C) $W_t = 1,7 \text{ kJ}$ (D) $W_t = 4,9 \text{ kJ}$ ■

5. Sinusno nihalo niha s frekvenco 40 Hz .

a) Koliko nihajev naredi nihalo v 60 s ?

(A) $N = 2400$ (B) $N = 1030$ (C) $N = 528$ (D) $N = 4560$ ■

b) Kakšna bi bila frekvenca nihala, če bi amplitudo nihanja zmanjšali na polovico?

(A) $\nu = 160 \text{ Hz}$ (B) $\nu = 20 \text{ Hz}$ (C) $\nu = 80 \text{ Hz}$ (D) $\nu = 40 \text{ Hz}$ ■

Konstante: $g = 9,81 \text{ m}/\text{s}^2$, $h = 6,63 \cdot 10^{-34} \text{ Js}$, $c = 3 \cdot 10^8 \text{ m}/\text{s}$.

SIZiF 2019, ver. 2.3 Podpis: _____ Stran 1 od 1, pola 3

Figure 3. Example of a PDF of a unique problem sheet, which can be printed and distributed among students.

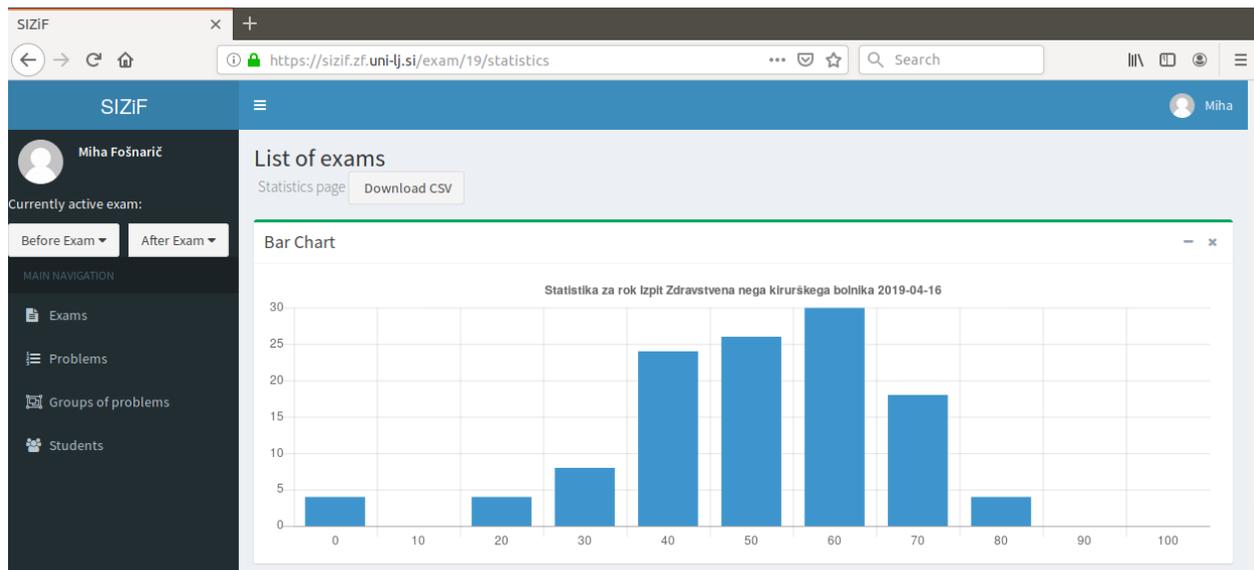


Figure 4. Screenshot of statistical analysis of the written examination.

4. Conclusions

In the design, development and use of the presented open-source system for generation, optical recognition and assessment of written exams, we built on the experience with the development and use of a similar system, which was in use for many years in multiple subjects on different Faculties of the University of Ljubljana, Slovenia. However, the system was composed and coded completely anew, with many new functionalities and upgrade possibilities.

It is therefore reasonable that during the implementation of the system on Faculty of Health Sciences, University of Ljubljana, Slovenia, there was a debugging process and installation issues, as well as problems of integration of the system with the existing printing and scanner facilities at the faculty.

Since 2018 the system has been running on faculty's already existing infrastructure - server, printer, scanner. No new hardware was needed. From the financial point of view, the cost for the faculty was therefore zero.

The system was applied to 6 faculty courses, used in more than 30 examinations and more than 2000 students' problem sheets were generated, printed, scanned and processed.

The feedback of the students is mostly very positive. Students like objectivity and fast feedback provided by the optical recognition and automatic assessment of written exams.

Faculty staff that have experience with the system welcome the drastic decrease of cheating due to unique problem sheets and the time saved with automatic assessment of the exams.

In the whole procedure of generation, optical recognition and assessment of the written exams, there is of course room for errors and complications. The later are most frequent at printing and optical recognition.

Therefore there is a question to bypass these steps by making written exams completely paper-free and therefore also possible to perform on-line. In this case the question of integration with other open-source systems, like Moodle, becomes a very interesting possibility to consider.

The whole project still all runs on voluntary basis. Therefore there is also an open question of systematic technical support on the server, printer and scanner level, as well as on the level of other user support and development. The system is still not very user friendly on some levels, since some steps still demand some expert knowledge. For broader implementation at least a web interface should be more user friendly and bugs free.

How to approach the above problems still remains to be solved. A possibility is maybe applying for a funding project for further development and implementation of the system. However other ideas are very welcome.

Finally, let us again note that the whole system for generation, optical recognition and assessment of written exams is designed and built on open-source technologies (Penič, 2019a, b, c). Possible developers and users are therefore welcome.

Acknowledgements

Special thanks to Assoc. Prof. dr. Samo Penič from the Faculty of Electrical Engineering, University of Ljubljana, Slovenia. Without his software and hardware expertise and dedication to open-source development this whole project and its predecessors would not be possible.

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Emotional Intelligence and Job Performance

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Abstract

This paper highlights the relationship between emotional intelligence and performance of employees. An in-depth analysis of this relationship was conducted using case study approach, including 54 employees in the insurance company. Findings from this research confirm that insurance agents with higher emotional intelligence are more successful at work. Higher achieving employees demonstrate higher total emotional intelligence, intrapersonal skills, stress tolerance and adaptability. We argue the measurement of emotional intelligence should be included into selection process regarding employment decision. Findings of the research offer important insights in understanding why and how we need to include the training programs regarding emotional intelligence into the educational and skills development programs. The purpose of our research was not to create a new theory. Our intention was to help to expand and complement the existing theory with important managerial implications.

Keywords: emotional intelligence, performance, employee, case study.

1. Introduction

Emotional intelligence of employees has been one of the most popular concepts in the field of organizational behaviour in the last decade. We may expect further studies on this issue in the near future. Emotional intelligence is an essential part of whole person. For more than two decades researchers have been trying to understand the relationship between the performance of employees and emotional intelligence. The performance of employees depends on the attitude toward: challenges, obstacles, effort as well as toward criticism. With the increasing global competition, companies are looking for incentives to increase performance of employees. Therefore, the organizational behavior of employees is still under researched field.

The competitive business dynamics reflect the changing global business environment and the organizational response of companies whose competitive strategies increasingly involve development of core skills. Emotional intelligence is the foundation for critical competitive skills. As soon as at least one competitor gains from taking new critical skills, the competitive forces begin to change, with the leading firms in the market needing to respond.

The dynamic nature of such responses should inevitably results in increased productivity of employees. Current challenges of companies require better co-ordination and relationships with customers, suppliers, distributors across functions and geographical boundaries. We argue emotional intelligence of employees strongly determine these relations and consequently job performance. Employees who respond to challenges with hope and resilience instead with anger and hopelessness achieve higher business and social success. Low levels of self-awareness and empathy are associated with poor achievement.

We first provide a review of relevant studies of this topic in emotional intelligence. Then we describe the study methodology and reasons for using quantitative study in our case. Furthermore, we summarize results of the data analysis. Discussion of results brings us to conclusion of the study's findings and implications.

2. Literature Review

Over the last twenty-five years, the number of research on emotional intelligence has increased dramatically (Barchard & Brackett & Mestres, 2016). Research shows that emotionally smarter individuals are generally more creative and more diligent at work and are more satisfied, so their productivity and adaptability are increasing, and the company also increases its competitive capacity (Jafari & Dem & Choden, 2016; Dessti, Shanthi, 2015; Brackett, Rivers, Salovey, 2011; O'Boyle et al., 2011). Therefore, it is appropriate to identify the stars in the performance and to identify what skills are necessary for such productivity at work. In doing so, emotional intelligence is the common core of personal and social skills that provides success (Goleman, 1995). Empirical research has also confirmed that emotional intelligence is positively linked to the effectiveness of employee management (Bano, 2013; Antonakis & Ashkanasy & Dasborough, 2009).

In examining the impact of emotional intelligence on the performance of the individual in the workplace, researchers have not limited studies to profit-making activities. They tried also to predict the effectiveness in education with regard to the emotional intelligence of individuals (Fernandez & Salomonson & Griffiths, 2012; Qualter et al., 2012; Jiwen et al., 2010). Some others explain the effectiveness of pedagogical workers in the implementation of this process by using the emotional intelligence factors (Mafuzah & Jais, 2016).

The issues associated with the role of emotional intelligence in the performance of the individual were further gained in importance through the development of neo-science and, consequently, the field of neo-leadership (Iacoboni, Mc Haney, 2009). Some authors (Cherniss, 2010) point out that the link between emotional intelligence and the performance of an individual in the workplace is more important in those activities that include more social interaction and, consequently, they include more stress.

The factors that determine why and how one business outperforms another have been the subject of considerable research. In general, the debate has focused on competitive positioning, resource or competence-based theory and knowledge-based approaches. The first of these approaches, the subject of Porter's work, concentrates on developing a strategic framework by viewing a firm in the context of its environment (Porter, 1987).

The second sees superior performance as a consequence of the special resources of an individual organization (Grant, 1991). This approach is called the resource-based theory. The third approach is based on core competencies that can be defined as a combination of resources and capabilities that are unique to a specific organization and which are responsible for generating its competitive advantage (Prahalad, Hamel, 1990).

The knowledge-based theory is the fourth approach focused on the importance of knowledge management and organizational learning in building and maintaining a competitive edge (Whitehill, 1997). The average period in which firms are able to sustain a competitive advantage has been decreasing. Li and Liu study (2014) shows that dynamic capabilities significantly positively affect competitive advantage, and that environmental dynamism is an important driver.

Although each of these approaches provides a method by which superior performance can be investigated, it is the knowledge-based approach that in more recent times offers the best perspective to analyse the determinants of company's competitive advantage. In the study of competitive strategies of Slovenian and Croatian companies we found that managerial competencies are the most important. Human capital and organizational culture prevailed among the different types of knowledge that were important for achieving a competitive advantage (Buble et al, 2003). The organizational culture was defined as the pattern of beliefs, expectations and values shared by the organization's members. Within each firm the norms typically emerge and define what the acceptable behaviour of people from top management down to the operative employees is.

3. Research Methodology

Our study focuses on relationship between emotional intelligence of employees and performance, where the focus is on exploratory in-depth analysis of relationship under study. Our survey is based on primary and secondary data collection. We used a deductive approach when designing a research plan. After defining the research work, we examined the literature for the problem at hand. We have used one of the existing survey questionnaires to test the emotional intelligence of the individual. In the questionnaire we tried to capture all areas related to emotional intelligence. In the survey questionnaire, we used open and closed form of questions. The closed form of questions is more appropriate in verification studies, because it allows generation, and the answers to such questions can be verified by certain hypotheses. Closed questions with the answers offered enabled us to determine the basic characteristics of the insurance agents. In our study we used Likert's scale with five intensities.

Our research is a good background for any subsequent longitudinal research regarding impact of emotional intelligence on the performance of the employees in services. The basic method of analysis of questionnaires is comparative static. Research work is based on the data of the Insurance Association which operates in Slovenia. The performance of insurance agents is measured with the generated annual sale and not with the number of insurance policies sold. We argue that the generated sale is a more relevant performance criterion for both the individual and the company.

The respondents were insurance agents who had long-term contract in the selected company. Insurance agents have made their replies by using online survey. An online survey was consisted of 3 sets and contained 43 questions and 95 variables. We used factor analysis to analyse the data. The emotional intelligence of insurance agents was measured by using standardised Goleman emotional intelligence test. As explained, annual sale of the specific insurance agent was used as a performance criterion. Finally, we have produced a regression model to determine the relationship between the emotional intelligence and the sales of insurance expressed in Euros.

We targeted 141 insurance agents with a regular long-term employment relationship with the largest Slovenian insurer. We included 51 respondents who fully completed the questionnaire in the research sample that gives us 36.2% respond rate. The questionnaires that were not fully completed were not included in the research test. We used Goleman approach to determine emotional intelligence. Goleman determined that there are five fundamental features of emotional intelligence, each with their own benefits: self-awareness, self-regulation, empathy, intrinsic motivation and social skills.

4. Results

The value of the Kaiser-Meyer-Olkin measurement of statistical adequacy is 0.502. It means that indicators of medium-size are reflected in interconnectedness. Bartlett's Test ($P = 0,000$) shows that our test is highly statistically significant. Based on the implemented factor analysis, we can define the characteristics of our typical insurance agent. Our insurance agent is eloquent, persistent, altruistic, mediocre, insignificant member of the collective, who always holds the word and focuses on the company's objectives. We examined whether and how our emotional intelligence test influenced the sales of insurance (see Figure 1).

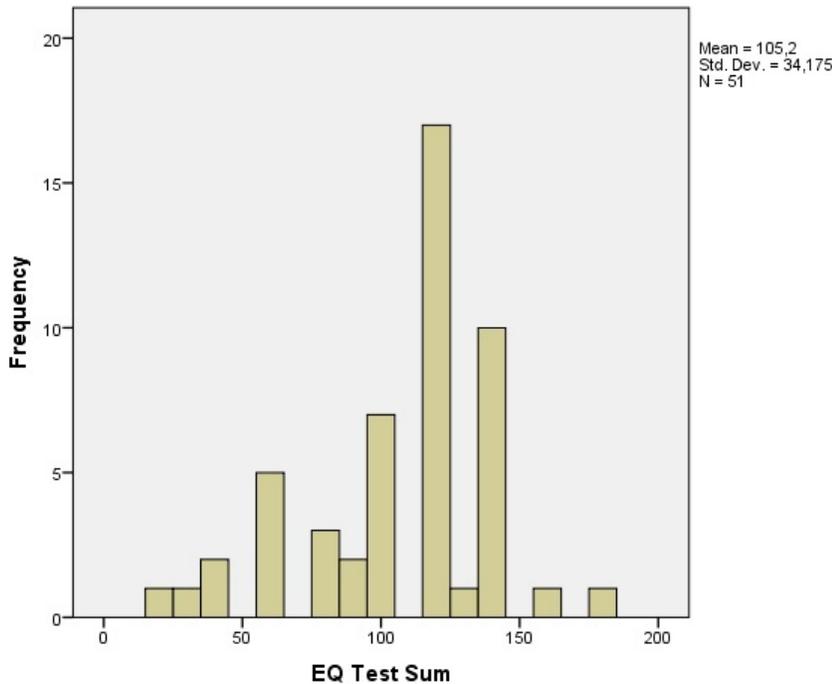


Figure 1: The results of the implemented EQ test

The minimum number of points was 0, up to 200. The respondents scored on average 105.2 points. For each point reached on the EQ test, sale is on average increased by €2,958.00 (see Figure 2). Based on sample data, our regression model is the following linear function:

$$\text{Sales} = 61.531 + 2,958 * \text{Test EQ} \quad (p=0,018)$$

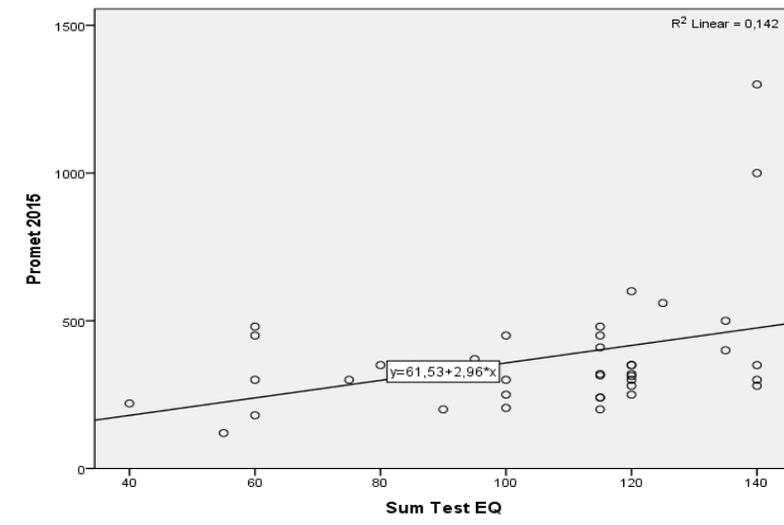


Figure 2: Correlation between sales and the results on the EQ test

Based on the F-Test (6.100), we may reject a zero hypothesis of independence between the two examined variables ($p = 0,018$). The sale of insurance is linear depending on the number of points achieved in the EQ test. It means that our hypothesis regarding positive relation between emotional intelligence of employees and the effectiveness of their work as insurance agents is confirmed. The evaluation of the Pearson correlation coefficient is equal to 0.376. It means that the linear correlation between the results on the EQ test on one hand and the sales on the other is positive and medium-strong.

Estimated on a sample of 39 respondents (we removed the isolated cases) we found out that the performance of the insurance agents was positively linked to emotional intelligence. The regression model suggests that the higher the score on the EQ test, the more successful the insurance agent is at work. Therefore, when recruiting insurance agents the EQ of the candidates should be considered as one of the criteria. Higher achieving employees demonstrate higher total emotional intelligence, intrapersonal skills, stress tolerance and adaptability.

5. Discussion and Limitations of our Study

Our empirical contribution is based on the quantitative in-depth research of the characteristics of insurance agents and their performance. We use the a case study in the insurance industry. We believe that our research help to fill the gap, which reflects the lack of such research in the field of insurance. This study gives us some empirical insights to the problem at hand.

We have limited the survey to the largest insurance company in Slovenia. This has some implications regarding external validity and generalization of the results of the case study on the population. However, we selected a representative company of the insurance industry in Slovenia. Therefore we believe there is a possibility of generalization on the entire industry considering limitations applicable to the quantitative research. That is why we decided to use a relatively comprehensive and in-depth questionnaire in the survey of insurance agents.

We have been able to include 51 respondents who have fully participated and completed the survey. Only 36% respond rate is a certain limitation in the interpretation of results. However, we estimate that the responsiveness is still acceptable. It is also comparable to similar research. We should also consider that even the most cited author in this field of research indicates that there

is no test that could accurately measure the emotional intelligence in absolute numbers. Therefore, when interpreting our research, it is necessary to consider that we have gained a relatively good approximation of the result of emotional intelligence by using the emotional intelligence test.

The performance in work of the insurance agents was measured by the sales generated. We could also use some other criteria, such as the number of insurance policies concluded. However, we believe that the generated sale is a key criterion in assessing the performance of employees in insurance company.

After all, the sale generated is also the foundation for a variable part of the remuneration of insurance agents. Therefore, this criterion is also relevant to the scholars in assessing the job performance of individuals. We should not disregard that the quantitative part of our research is based on the use of factor analysis and linear regression. This fact should also be taken into account when interpreting the results. Other methods could be used in further research. The primary purpose of our research was not to create a new theory. Our intention was to help to expand and complement the existing theory with important managerial implications.

6. Conclusion

Our study reveals a medium-strong positive correlation between the emotional intelligence of insurance agents and the performance of their work. Therefore, companies in the field of insurance should include emotional intelligence of job applicants as one of the most important criteria for recruitment. Emotional intelligence skills can be enhanced in a college or company internal course. The results of our research imply that companies should include the development of emotional intelligence into the programs of additional education.

Companies need to consider that the emotional intelligence of an individual with its development varies. Employees should have the opportunity to gain and develop skills in the field of emotional intelligence. Our study has some limitations. The results refer to the largest insuring company in Slovenia. The possibilities for further research are primarily in the longitudinal research. In future studies other insurance companies in other countries could be involved and comparing the results to each other.

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Structural Modelling of Psychological Limiting Factors for Economic Growth

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Abstract

The main objective of this paper is to develop a structural model of psychological limiting factors for economic growth. Specifically, the paper aimed to determine the psychological demographic characteristics, psychological environmental factors, psychological human behaviour and psychological economic factors those influence economic output in Kagera and Mwanza. The paper uses cross-section survey/data from Mwanza and Kagera regions. The sample size of the study was 211 individuals, sampled randomly. The data analysed by using Partial Least Square-Structural Equation Modelling (PLS-SEM). The study found that psychological demographic characteristics, psychological human behaviour and psychological economic factors have significant direct impacts on economic growth. However, the psychological environmental factors have a negative impact on the economic growth, but it is not statistically significant. Moreover, the study establishes the *quasi-sinusoidal theory of happiness timing*, which explains the nature and timing of happiness on boosting the economic growth, which responds to Easterlin Paradoxical paradigm. The study concludes that the economic output (GDP) in any production system is depends on how economic agents define their own “live value” (psychological well-being) and the level of psychological control of factor of productions (Subjective Well-being). However, the optimality of utility choices of the economic agents’ decision is enclosed by level of happiness (psychological outcome). Hence Kagera region is performing worse because of its low psychological well-being. The paper suggests the implementation of psychological booster strategies (PBS) such as the homing nurtures, mental balance exercises and youth economic support (YES) centre.

Keywords: Structural modelling, Psychological Well-being, Economic growth, subjective well-being, happiness model.

1. INTRODUCTION

The economic growth is a key agenda for many economists in the global. The sustainability and predictability of the economic growth are still fundamental challenges for many countries in the world, mostly in Africa. Tanzania as the one of the African countries that has been implementing various global, regional and national economic plans with endless effort her economy is still unpredictable, unreliably, and unevenly grows across the country. The country is still challenged with structural imbalance and modest growth (Masenya, *et al.*, 2018). Some regions in a country are characterised with the lowest regional GDP per capita, for example Singida, Kigoma, Kagera, Dodoma, Tabora and Mara (URT, 2019a). Meanwhile, other regions such as Dar es Salaam, Mbeya, Iringa, Njombe, and Arusha are characterised with the highest economic growth in the country (URT, 2019a). Puzzlingly, the regions such as Kagera and Mwanza are highly differ in economic growth, although they almost share a lot of economic opportunities. For example they share Lake Victoria in a large proportion, and having a close inter-regional trade (URT, 2019c). Still yet, Kagera region has the least economic growth in the lake zone. Its GDP per capita is 41 percent below the average national GDP per capita in 2018 (URT, 2019b). But, neighbour region Mwanza which has a direct trade connection, its economy grows at 0.04 percent above the national GDP per capita in 2018 (URT, 2019b). In fact, Kagera region is expected to be the region that performs better in economic, but realistically, it is not performing well as expected. These empirical facts create the economic questions as why Kagera region differs economically with their neighbour Mwanza, and other regions in the Lake Victoria zone despite to its vast economic opportunities. Moreover, what are the specific limiting factors for economic growth in Kagera that

significantly differ from that of other regions in the lake zone? Do other factors matter for economic growth instead of economic variables that are opportunistic to all regions in the zone of Lake Victoria? Diener and Seligman (2004) support this research problem as concluded that the socioeconomic and political measures have seriously failed to provide a full account on policy decisions at the organizational, corporate, and governmental levels. In addition, they emphasise that economic output /economic growth is heavily influenced by issues related to well-being as people's evaluations and feelings about their lives (Diener and Seligman, 2004). However it is still debated on this issue on the literature.

The psychological well-being theories are found to have empirical misfits (shortcomings). The neo-economic theory models human behaviour in assumption of self-interested individual choices and it ignores the cognitive limitation (bounded rationality) (Miyamura, 2020). Moreover, the Eudaimonic theory doesn't capture the Aristotle's philosophy of worth pursuing in life (objective standard of goodness) (Heintzelman, 2018), and the Hedonic theory assume the positive subjective well-being (SWB) is subjected to the positive perceived outcome/judgment of an individual. This theory cannot be a rival to its own level (Heintzelman, 2018). Empirically, it is still unknown what are the actual non-economic limiting factors for economic growth in Tanzania, particularly in Kagera region; hence it is still a puzzle. Moreover, the impact of psychological factors on economic growth, it is still debated widely, under the Easterlin paradoxical effects (Easterlin, 1973; 2017). Researchers reached diametrically opposed conclusions. For example, Easterly (1973; 2017) stand on paradoxical effects, Roka (2020), Semeijn, *et al.*, (2020), Meyer and Hamilton (2020) and Stevenson and Wolfers (2008) stand on positive effects, while Stoop, *et al.*(2019) stand on negative effects. Until now there is no consensus that has been reached, this debate increases the policy dilemma for decision makers. Hence, this paper fills this methodological gap particularly in Tanzanian settings by integrating, neo-classical economic theory, eudaimonism and hedonism approaches as the previous studies/theories overlooked. Hence, a main objective of this paper is to develop a structural model of psychological limiting factors for economic growth in Tanzania. The paper specifically, aimed to determine the psychological demographic characteristics, psychological environmental factors, psychological human behaviour and psychological economic factors those influence economic output in Kagera and Mwanza.

2. Methods

This study adopted the positivistic philosophy where there is a belief in the hypothesis based on a social reality and is referred to as the philosophical stance of the natural scientist which assumes that reality is fixed, measured, and knowable and that there is one truth. The cross-sectional research design was used. The population of this study is 31 regions in Tanzania mainland. The two regions are purposely selected, Mwanza and Kagera and two districts are randomly selected from each region, makes a total of four districts which are Nyamagana and Misungwi districts from Mwanza regions, and Muleba and Bukoba districts from Kagera region. The 211 individuals are sampled from four districts by using the method of Tabachnick and Fidell (2019) who suggest a sample size of $N > 50 + 8m$ for multivariate data analysis (where N is the sample size and m is the number of independent variables) and $N > 104 + m$ for testing individual predictors. Therefore, the minimal sample size would be 119 (obtained from the formula; $N > 104 + m$, where $m = 15$). Thus a sample size of 211 respondents is deemed to be sufficient for this study.

2.1. VARIABLES AND MEASUREMENTS

The dependent variable is an economic growth which is measured by economic output in a region (regional GDP per capita). On the other hand, the independent variables which are psychological limiting factors compose two broad dimensions of limiting factors measured in 5-points Likert Scale (Appendix B). These factors are psychological well-being (PWB) which composes psychological human behaviour scores (*HUBE*). On the other hand, the subjective well-being (SWB) composes psychological economic scores, (*ECOFA*), psychological environmental score (*ENVT*), and psychological demographic score (*DEMO*).

2.2. MODEL SPECIFICATION

This study regards to develop a structural model of psychological limiting factors for economic growth. The five models will be tested to better determine how explanatory variables impact dependent variables. The same four models are used for all five levels of the gross domestic product (GDP) per capita. The models are described in greater detail below in a general mathematical form, a GDP per capita function can be expressed.

Model I: Psychological Demographic Characteristics (Age, Marital Status, Number of family members, Income, Educational level)

Model I: Psychological Demographic Characteristics (Age, Marital Status, Number of family members, Income, Educational level)

$$\ln PSY_{Demoli} = \beta_0 + \beta_1 \ln Age + \beta_2 \ln Mari + \beta_3 \ln Nfam + \beta_4 \ln Inc + \beta_5 Edu + \epsilon_0 \dots \dots (1) \text{Model II:}$$

Psychological Environmental Factors (Sustainability, Social awareness, Policies, Regulations),

$$\ln PSY_{Envi2i} = \beta_0 + \beta_1 \ln Sus + \beta_2 \ln Soa + \beta_3 \ln Pol + \beta_4 \ln Re gu + \epsilon_0 \dots\dots\dots (2)$$

Model III: Psychological Human Behaviour (Lifestyle, Motivation, Metacognition)

$$\ln PSY_{Hube3i} = \beta_0 + \beta_1 \ln Listy + \beta_2 \ln Moti + \beta_3 \ln Meta + \epsilon_0 \dots\dots\dots (3) \text{ Model IV:}$$

Psychological Economical Factors (Prices, Fashion, Weather).

$$\ln PSY_{Ecofa4i} = \beta_0 + \beta_1 \ln Pr + \beta_2 \ln Fash + \beta_3 \ln Wea + \epsilon_0 \dots\dots\dots (4) \text{ Model V: Total}$$

Gross Domestic Product

$GDP = f$ (psychological demographic characteristics, psychological environment factors, Psychological human behaviour and psychological economical factors)

$$\ln GDP_{5i} = \beta_0 + \beta_1 \ln DEMO + \beta_2 \ln ENVIr + \beta_3 \ln HUBE + \beta_4 \ln ECOFA + \epsilon \dots\dots\dots (5) \text{ Where, } \beta_{i=0,1, \dots}$$

are coefficients constants of the OLS estimation model, and PSY denotes psychological limiting score, the rest variables are defined on the respective word equations.

3. Results

3.1: Respondents Profile

The 211 respondents sampled from Mwanza and Kagera regions. The respondents from Mwanza were 111 individuals and those from Kagera region were 100 individuals. The demographic characterises of the respondents are female 75, equal to 55.15 percent, the respondents of age of 18-30 years composes about 52.60 percent and that of 61-70 year composed about 2.4 percent. The marital status of the respondents that dominated in the sample is married about 62.6 percent. The dominated occupation cadre of the respondents are farmers about 62.6 percent, and primary educations level about 55.9 percent. Only 35.07 percent were secondary leavers and the 9.0 percent are college/university graduates.

3.2 Evaluation of Outer Measurement Model

The evaluation of the outer measurement model aimed to assess the quality of the instruments used to collect the data (questionnaire). It is carried out by assessing the reflective and formative measurement models. This study considers the internal consistency reliability, measured by ρ -A coefficients, with a cut-off value of 0.70. This method is suggested to be the best among the Cronbach's alpha and composite reliability (Dijkstra and Henseler, 2015). Hence, the ρ -A coefficients of this study ranges from 0.932 to 0.975, which indicates the existence of high internal reliability consistency of the reflective constructs (Table 1). Moreover, the convergent validity is measured by the average variance extracted (AVE) of the latent's construct which has a minimal acceptance value of 0.50 (Hair, et al, 2019). In this study the AVE ranges from 0.863 to 0.925 which indicates that the constructs explains at least 86.3 percent of the variance of its item (Table 1).

Table 1: The Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	P values
Demo	0.966	0.969	0.974	0.882	0.000
Ecofa	0.956	0.958	0.971	0.919	0.000
Envi	0.973	0.975	0.980	0.925	0.000
Hube	0.920	0.932	0.950	0.863	0.000

Source: Field Data (2020)

Table 2: Latent Variable Correlations and the Variance Inflation Factor (VIF) value

	Original Sample (O)	Sample Mean (M)	Std. Deviation (STDEV)	T Statistics ((O/STDEV))	VIF	P Values
Demo -> AGDP	0.663	0.665	0.057	11.674	1.340	0.000
Ecofa -> AGDP	0.532	0.531	0.045	11.737	1.241	0.000
Ecofa -> Demo	0.379	0.379	0.071	5.381	1.096	0.000
Envi -> AGDP	0.274	0.279	0.090	3.053	1.380	0.002

Envi -> Demo	0.419	0.421	0.067	6.237	1.218	0.000
Envi -> Ecofa	0.288	0.290	0.078	3.669	1.233	0.000
Hube -> AGDP	0.375	0.375	0.053	7.069	1.286	0.000
Hube -> Demo	0.297	0.298	0.069	4.283	1.000	0.000
Hube -> Ecofa	0.315	0.314	0.071	4.411	1.096	0.000
Hube -> Envi	0.418	0.420	0.069	6.101	1.157	0.000

Source: Analysed filed data (2020).

On the other hand, the formative measurement models are evaluated by considering the convergent validity, formative indicators colinearity and statistical significance (Hair *et al.*, 2019). The convergent validity of latent variables was examined by using the correlation of the construct with alternative measures of the same concept, the procedures is referred as the redundancy analysis (Chin, 1998). Moreover, the colinearity of the latent variable was examined by using variance inflation factor (VIF) value. The table 2 shows the correlation of the latent variables and the VIF values. Both the correlation values are statistically significant at 99 percent level of confidence. On the other hand, the VIF values are extremely low than the cut-off value of 0.5. This indicates the absence of colinearity among the latent variables.

3.3 .Evaluation of Inner Measurement Models

In the previous section we confirmed that the outer measurement models were valid and reliable. In this section, the evaluation of the inner structural models outcomes was done. This study considered the coefficient of determination (R^2), the predictive relevance of the model (Q^2), T-statistical value, effect size (f^2), relevance of the path coefficient (β value), and goodness -of-fit (GOF) index. The R^2 values ranges from 0.088 of Demo and 0.555 on averaged GDP per capita (AGDP). As a guideline, R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak (Henseler *et al.*, 2009; Hair *et al.*, 2011). The Q^2 statistics are used to measure the quality of PLS path model, which is calculated using blindfolding procedure (Tenenhaus, *et al.*, 2005). The predictive relevance of the structural model (Q^2) is ranges from 0.074 on Demo to 0.524 on AGDP (Table 3).

Table 3: The coefficient of determination (R^2) and the predictive relevance (Q^2) values of the model

	R^2	$Q^2 (=1-SSE/SSO)$	$Q^2_{predict}$	R^2 -P Values
AGDP	0.555	0.524	0.143	0.000
Demo	0.088	0.074	0.087	0.032
Ecofa	0.189	0.165	0.104	0.001
Envi	0.275	0.245	0.196	0.000

Source: Analysed Field Data (2020).

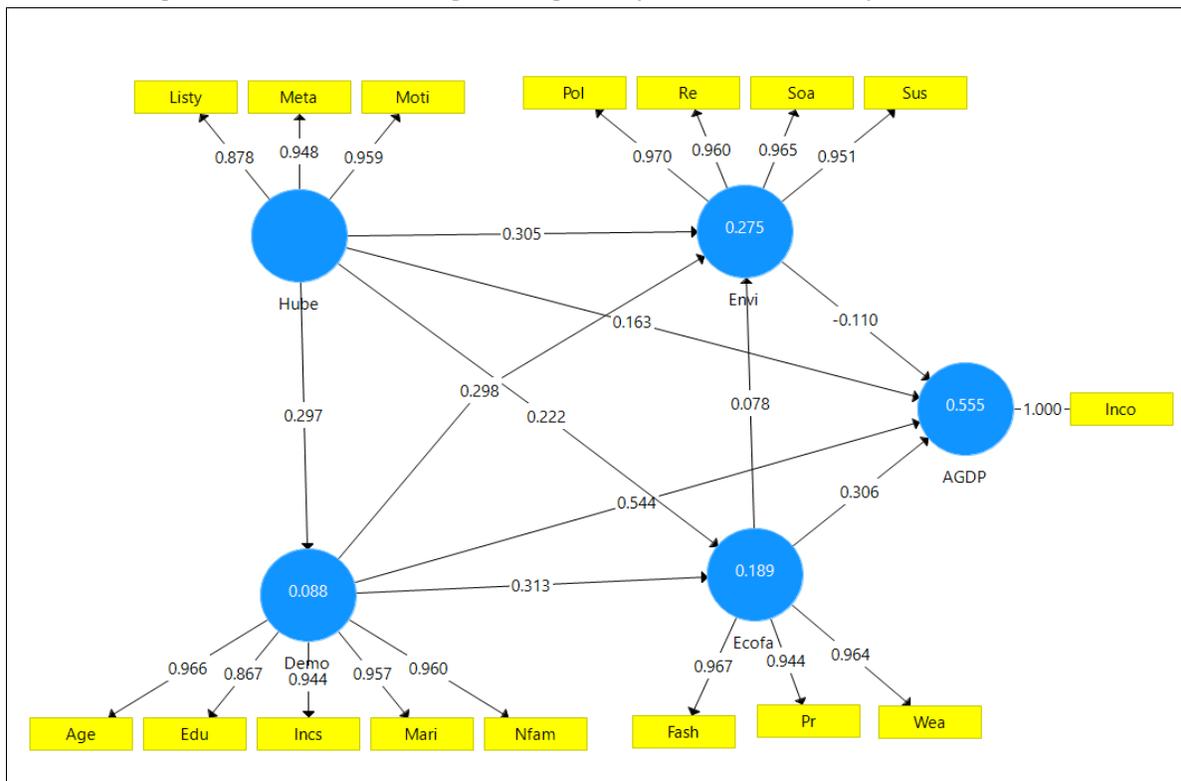
As a guideline, Q^2 values should be larger than zero for specific endogenous construct to indicate predictive accuracy of the structural model for that construct (Hair *et al.*, 2019). As a rule of thumb, Q^2 values higher than 0, 0.25 and 0.50 depict small, medium and large predictive relevance of the PLS-path model (Hair *et al.*, 2019). Hence, the AGDP has a predictive relevance and *Envi* and *Ecofa* have medium predictive relevance in the PLS path model. The *Demo* has the least predictive reliance in the PLS path model. Next, the relevance of the path coefficient (β value) and the size effect (f^2) was examined. The path coefficient (β value) denotes the expected variation in the dependent construct for a unit variation in the independent construct(s) (Hussain, *et al.*, 2018). The β value of every path in the hypothesised model was computed, the greater the β value the more the substantial effect on the endogenous latent construct (Chin, 1998). To test the significance of the path coefficient and T-statistics value, a bootstrapping procedure using 5000 subsamples was carried out for this study. The PLS algorithm, which is a sequence of regressions in terms of weight vectors evidences that *Demo* has the most effect on the economic growth, and the *Envi* has a negative impact on the economic growth (Figure 1), although it is no statistically significant, the *Ecofa* and *Hube* have the moderate effect on the economic growth (Table 4). The effect size (f^2) is the effect of a removal of a certain predictor construct on endogenous construct's R^2 value (Hair *et al.*, 2019). Thus, it defines whether the removed latent exogenous construct has a significant influence on the value of the latent endogenous construct (Hussain, *et al.*, 2018). The *Demo* has a highest size effect and *Envi* has the least size effect on the model (Table 4). As a rule of thumb, values higher than 0.02, 0.15 and 0.35 depict small, medium and large effect sizes (f^2) (Cohen, 1988).

Table 4: The Path Coefficient (β -Value) of Structural Model and Size Effect (f^2) Value

	β -Value	f^2	Std. Devi (β -Value)	T Statistics (β -Value)	P Values (β -Value)
Demo -> AGDP	0.544	0.496	0.065	8.426	0.000
Demo -> Ecofa	0.313	0.110	0.073	4.314	0.000
Demo -> Envi	0.298	0.101	0.065	4.610	0.000
Ecofa -> AGDP	0.306	0.170	0.056	5.472	0.000
Ecofa -> Envi	0.078	0.007	0.079	0.996	0.319
Envi -> AGDP	-0.110	0.020	0.069	1.599	0.110
Hube -> AGDP	0.163	0.046	0.064	2.560	0.011
Hube -> Demo	0.297	0.096	0.069	4.283	0.000
Hube -> Ecofa	0.222	0.056	0.077	2.892	0.004
Hube -> Envi	0.305	0.111	0.070	4.354	0.000

Source: Analysed Field Data (2020)

Figure 1: the Partial Least Squares Algorithm for Formative and Reflective indicators



Source: Analysed field data (2020).

Goodness-of-fit (GOF) is applied as an index for complete model fit to verify that the model sufficiently explains the empirical data (Tenenhaus, *et al*, 2005). The GOF values lies between 0 and 1, where values of 0.10 (small), 0.25 (medium), and 0.36 (large) indicate the global validation of the path model (Hussain, *et al*, 2018). A good model fit shows that a model is useful (Henseler, Hubona and Ray, 2016). The GOF is calculated by using the geometric mean value of the average communality (AVE values) and the average R^2 values, and the GOF of the model is calculated by Equation (Tenenhaus *et al*. 2005).

$$GOF = \sqrt{\text{Average } R^2 * \text{Average communality (AVE)}}$$

The higher value of GOF shows that empirical data fits the model satisfactory and has substantial predictive power in comparison with baseline values (Hussain, *et al*, 2018). The GOF of this study is 0.4984 which indicate the models largely fits the empirical data, hence the model is relevance and high degree of accuracy (Table 5).

Table 5: the Goodness –of- fit (GOF) of the structural model

Construct	AVE	R ²
Demo	0.882	0.088
Ecofa	0.919	0.189
Envi	0.925	0.275
Hube	0.863	
AGDP		0.555
Average Value	0.8973	0.2768
AVE x R ²	0.2484	
GOF = $\sqrt{(AVE \times R^2)}$	0.4984	

Source: Analysed field data (2020).

3.4 . The Mediation Analysis of the Structural Model

After analysis of the direct impact of the model, we strived to examine the mediation effects on the linear model. This was done by calculating the variance account for (VAF) ratio for each specific indirect effect. The VAF is the ratio of the specific indirect effect to the total effects in the structural model. The structural model shows no full mediation of the latent variables, hence the direct impact of the latent variables (psychological factors) on economic growth is granted (Table 6). The VAF values that less than 0.20 indicates no mediation, above 0.20 but less or equal to 0.80 is a partial mediation, and above 0.80 is a full mediation (Hair *et al.*, 2013)

Table 6: Specific indirect effects of the construct of the latent variables

Model with its Optimal Mediator	Original Sample (O)	Sample Mean (M)	T Statistics (O/STDEV)	VAF	Mediation	P Values
Hube -> Demo -> AGDP	0.161	0.165	3.353	0.429	Partial	0.001
Demo -> Ecofa -> AGDP	0.096	0.093	4.088	0.159	No	0.000
Hube -> Demo -> Ecofa -> AGDP	0.028	0.028	2.969	0.075	No	0.003
Hube -> Ecofa -> AGDP	0.068	0.067	2.403	0.181	No	0.016
Hube -> Demo -> Ecofa	0.093	0.095	2.698	0.295	Partial	0.007
Hube -> Demo -> Envi	0.089	0.089	3.101	0.213	Partial	0.002
Ecofa -> Envi -> AGDP	-0.009	-0.007	0.824	0.03	No	0.410

Source: Analysed field data (2020).

3.5 . The Importance-Performance Map Analysis (IPMA)

For better conclusion the relative importance of the constructs in the structural model is established by using IPMA. To examine the relative policy or operational priority of the fundamental psychological limiting factors on economic growth planning the IPMA was run. The importance –performance was examined by using the path coefficients (high coefficient indicates higher impact). The path coefficients of IPMA on are presented on the algorithm (Table 7).

Table 7: Impact-Performance for Economic Growth Matrix for Latent Variables

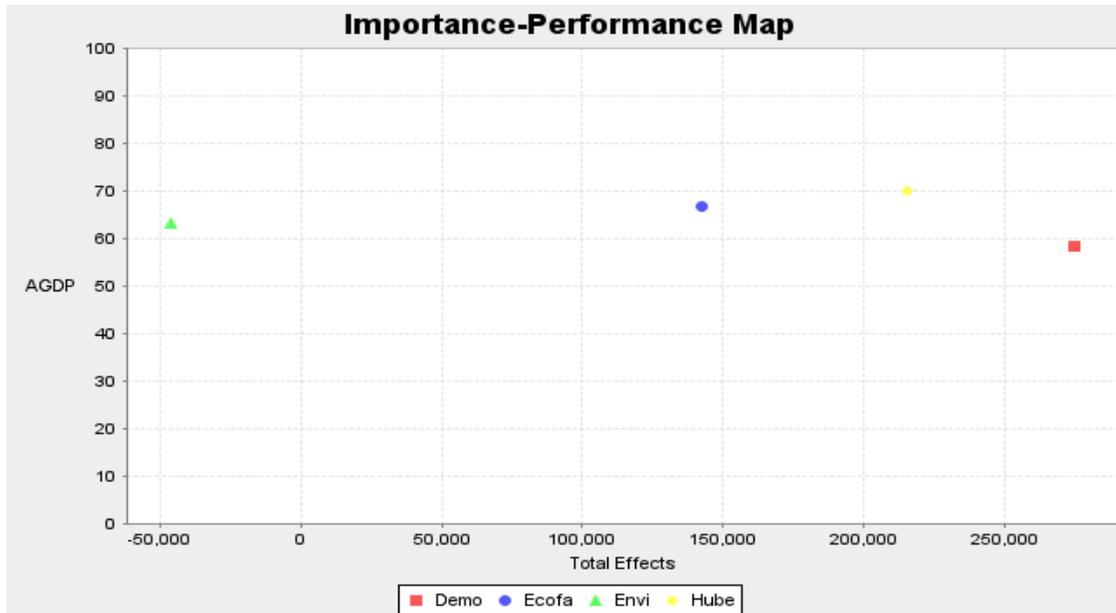
	Unstandardized		Standardized		P values
	Impact	Performance	Impact	Performance	
Demo	274266.099	58.442	0.605	58.442	0.000
Ecofa	142418.588	66.676	0.298	66.676	0.000
Envi	-45784.500	63.110	-0.110	63.110	0.110
Hube	215376.256	70.115	0.375	70.115	0.000

Source: Analysed field data (2020).

The table 7 shows the impact-performance matrix for the economic growth. The tables depicts that the psychological human behaviour have the higher importance-performance score (70.11) than all other latent variables. This means that, the psychological

human behaviour have higher importance in performing the economic activities. The second importance for economic performance is the psychological economic factors which have a score of 66.676, significantly at 99 percent level of confidence. Therefore we rank the performance of the fundamental psychological limiting factors from *Hube, Ecofa, Envi and Demo*, and we can rank them according to their impact (importance) on economic growth from *Demo, Hube, Ecofa and Envi* (Figure 2).

Figure2: The Importance –Performance Maps for Psychological Factors of Economic Growth
 Source: Analysed field data (2020)



3.6 Test of hypotheses
 The study was guided by four hypotheses. In accordance with the complete analysis of the measurement models and structural, it was determined that models were confirmed. Three hypotheses were statistically significant and hence were all three are accepted. The second

hypothesis is rejected. Hence there is no direct positive relationship between psychological environmental and economic growth. The results of this study supports a richer and accurate picture of the non-economic factors (psychological limiting factors) affecting the economic growth and can support building a set of strategies to overcome the economic growth barrier in Tanzania.

Table 8: The Tabulation of the Hypotheses Tests of the Study

Hypotheses statement	Statistics			Decision
	β -value	T-value	P-value	
H1: Psychological Demographical characteristics are positively and significantly influences the Economic growth	0.544	8.426	0.000	Accepted
H2: Psychological Environmental Factors are positively and significantly influences the Economic growth	-0.110	1.599	0.110	Rejected
H3: Psychological Human Behaviour are positively and significantly influences the Economic growth	0.163	2.560	0.011	Accepted
H4: Psychological Economic Factors are positively and significantly influences the Economic growth	0.306	4.611	0.000	Accepted

Source: Analysed field data (2020)

4. DISCUSSION

The impact of the non-economic variables such as psychological factors has been discussed broadly in various angles. Most of the researchers directed their enquiries on how the positive subjective well-being influences the economic growth (Roka, 2020; Semeijn, et al., 2020; Meyer and Hamilton, 2020; Easterlin, 1973). The most component that are aimed by many researchers is subjective well-being as the happiness. Earlier studies limit the definition of subjective well-being to happiness of an individual, hence creates the diametrical conclusion on how they affect economic growth (Easterlin, 1973; 2017; Stevenson and Wolfers, 2008). In reality, the happiness is the outcomes of both physiological and psychological impulses on the individuals. In the other words, the happiness of an individual is the final product or outcome of the both psychological and physiological impulses. For example, an individual can be happy because of marriage, or getting a job, or can be unhappiness (sadness) due to losing a job or marriage or anything that are valuable or interestingly. One of the challengeable questions is the “timing” of happiness of an individual, when an individual

can be happy, and how longer the happiness can last? Is it (happiness) a permanent, temporary or “alternating” phenomenon? Actually, the happiness is not a permanent phenomenon to the individual, in most cases; the happiness may be temporary or alternating phenomenon to the individual.

Economists critically urge on the impact of happiness, hereafter the psychological outcomes, on the economic growth. The first prominent paper by Easterlin(1973) evidenced the paradoxical effects psychological outcomes (subjective well-being) and economic growth. The paradoxical paradigm acutely criticised by Stevenson and Wolf (2008) who evidence the positive relations. Recently studies such as Roka (2020), Semeijn, *et al.*, (2020), Meyer and Hamilton (2020) evidences that happiness impulse has an impact on the individual economic activities plan and success, hence supports Stevenson and Wolf (2008). On the other hand, some studies confirm the negative impact, for example, Stoop, *et al.* (2019). To off-set this problem of Easterlin paradoxical and the ongoing debate, this study broadening the definition of the subjective well-being (happiness). More specific, this study establishes the factors that influence the degree of or that conditioning the happiness of an individual (determinants of happiness). In this study, the happiness is treated as the psychological outcome/outputs of physiological impulses. These happiness conditioning factors are psychological demographic characteristics, psychological economic factors, psychological environmental factors, and psychological human behaviour. Therefore, these factors are inputs of happiness model.

Relying on this study, the psychological impression of an individual on demographic characteristics, economic factors and the human behaviour have direct impact on the family income production, hence are economic growth activators. The study found that the positive psychological force on environmental issues has a negative impact on economic growth. This finding is a logical because most of the economic activities are associated with the environmental pollution. For example agriculture activities demand large bare land for cultivation, which results to deforestation. In addition, the economy to grow requires intensity industries, which increases both water and air pollution. On the other hand, the human behaviour such as life style, motivation and metacognition are found to be the importance factor that perform the best in economic growth, although has less impact. This is because, the human behaviour which is measures the psychological well-being is a fundamental input to happiness model (subjective well-being). This finding confirms the study by Roka (2020), Semeijn, *et al.*, (2020), Meyer and Hamilton (2020), and Stevenson and Wolfers (2008). However, the negative effect of the psychological environmental factors on economic growth confirm the study of Stoop, *et al.*(2019). Both the ongoing debate and the Eaterlin paradoxical effect are due to narrowed definition and nature of happiness, which is not permanent or stable in nature, but the income of an individual can be stable and sustainable or not, hence the changes or alternation of the level of happiness of an individual, with a constant income level, or vice versa can create a paradoxical effects. That is, sometime, happiness will be positively related to high income , because the happiness of a individual change but the income remain constant, and sometime the happiness will be positive related to low income if the an individual can loss income, but level of happiness is due to other non-income factors such as social engagement, marital status, games, etc. So in this can we need the theory that explains the timing of happiness which is lacks in this field.

Broadening the definition of happiness, this study establishes the theory that fits the timing of happiness controlling the fluctuation of psychological limiting factors. This theory, due to the nature and broaden definition of the happiness, the timing of happiness depends on the four factors, which are psychological demographic characteristics, environmental factors, human behaviour and economic factors. These factors are known as the four fundamental of psychological limiting for economic growth (4FPF). From this empirical fact, we evidence that, the outcome of psychological well-being of an individual (happiness/subjective well-being) is not constant, it is sinusoidally moves. Its level moves up and down as the mechanical waves, which sometime happiness changed to sadness and sadness passes when the happiness resumed, this phenomenon continuous to the entire life of an individual. This behaviour or phenomenon indicates the *quasi-sinusoidal behaviour of happiness timing*. In general this behaviour can be theorising the happiness model, hence it is the theory of happiness timing. This theory explains that the happiness and income cannot move together but they can meet at stage of life success or failure. That is, happiness has a period of accelerating to crest (period of happiness), at crest (joyfulness), this is the upward shifting or movement. In this period, the 4 FPFs have a positive influence on the fixed income. On the other hand, happiness has a period of decelerating to trough (period of sadness), at trough (full sadness), this is period of downward movement. In this period if, the income if fixed, the 4 FPFs show the negative influence on economic growth, because the level of happiness is reduced but the income remains constant (substantially high). But, for prolonged happiness can increase physiological and psychological positive outcomes (e.g. good health, mood, etc) so that increases the opportunities or probability of gaining more economic opportunity from social engagement.

5. CONCLUSION AND POLICY IMPLICATION

The study basically aimed to develop a structural model of psychological limiting factors for economic growth in Tanzania. To achieve this goal, four specific objectives were meets. This paper found that only one of the four fundamental psychological factors (4FPFs) have a negative impact on economic growth. This factor is the psychological environmental factors which are negatively to the economic growth. The logical interpretation of this phenomenon is that, the most of economic activities involve the destruction of the environments. For example, the industrialization policy has a negative impact of environmental conservation policy, particularly is the least developing countries. For instance, a farmer demand a large open land for cultivation, should cut the trees, and likely to cause erosion. The large or intensive industries will increase the GDP, but increase the water and air pollution if not

well managed. On the other hand, the improving the psychological human behaviour (psychological well-being) of an individual (mental capacity) increases the ability of an individual to make decision (judging capacity), and hence able to have a psychological control on demographic characteristics, environmental factors, and economic factors. Increase the control on these psychological factor increase the probability of an individual to engage in economic activities with success. Hence, we conclude that the economic output (GDP) in any production system is depends on how economic agents define their own “live value” (psychological well-being) and the level of psychological control of factor of productions (Subjective Well-being). However, the optimality of utility choices of the economic agents’ decision is enclosed by level of happiness (psychological outcome). Hence Kagera region is performing worse because of its low psychological resources (Appendix A).

In policy setting, this paper imposes an implication. It is still a big challenge to incorporation of psychological booster strategy (PBS) for economic planning. This paper suggests the two levels of incorporating PBS for economic growth planning. The first level is family based strategies which include homing nurtures, mental balance exercises or parental-mental mentoring, logical positivism and self- assurance programmes. The second level is the institutional/state based strategies, for instance, the establishment of social/community psychological centres, youth economic support (YES) centre, incorporation of programmes that improve both individual physiological and psychological well-being in learning institution, for example games and sports etc.

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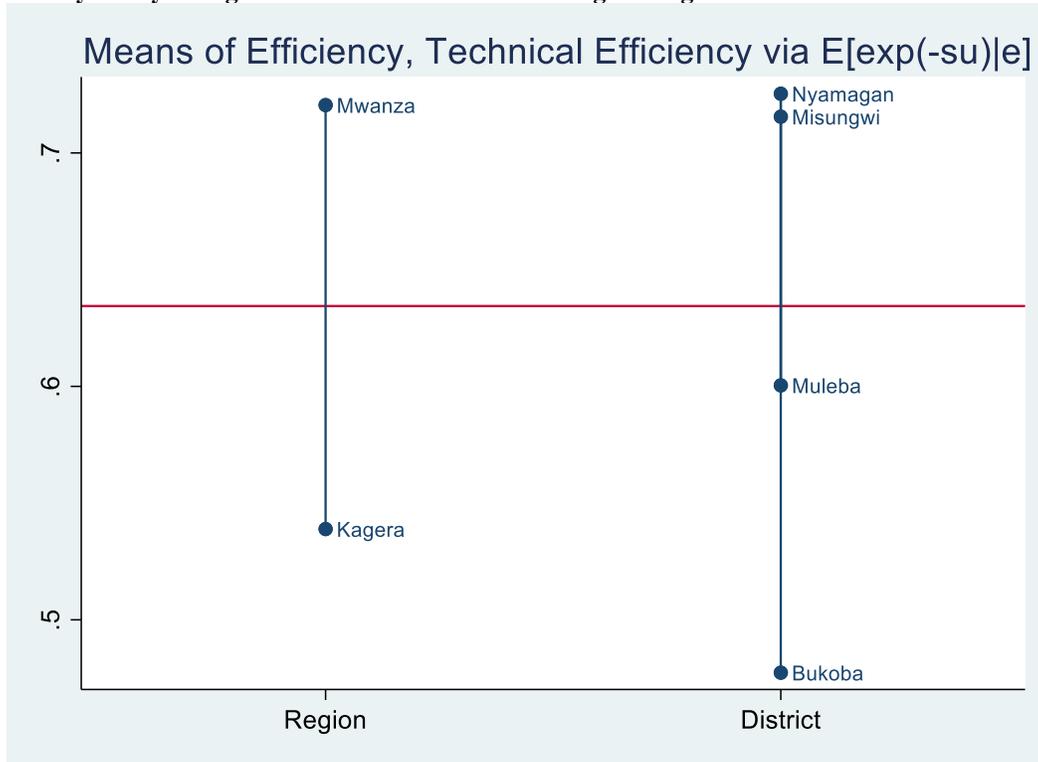
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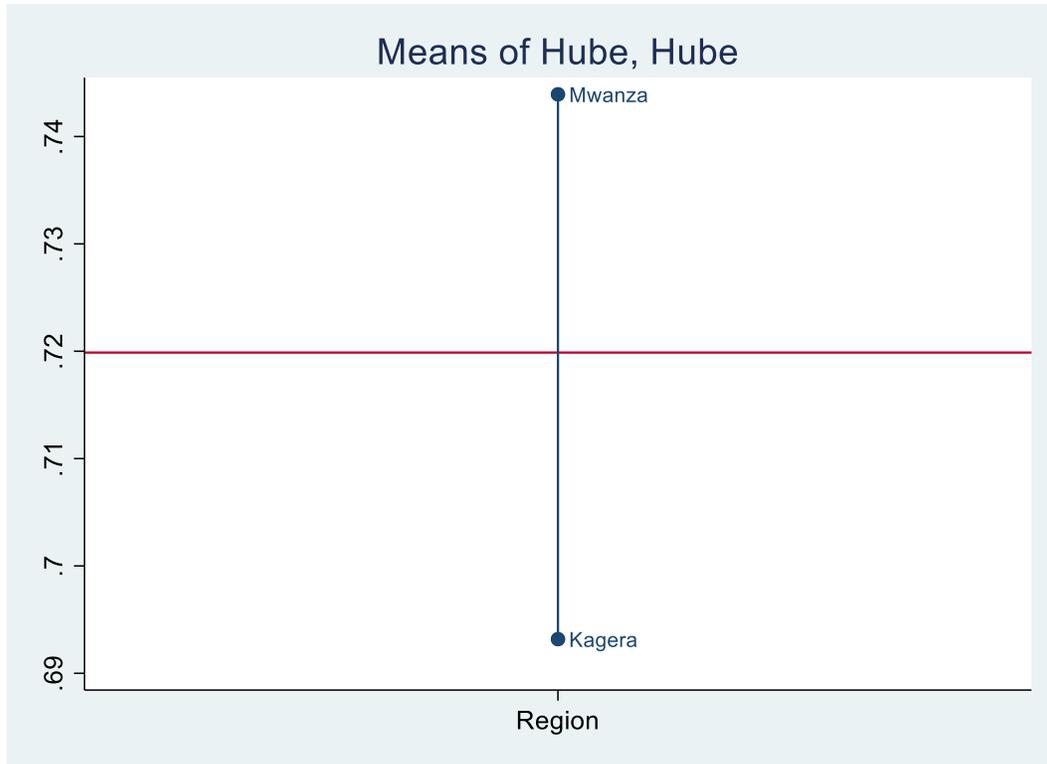
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Appendix A:

Technical Efficiency of Psychological Factors in Mwanza and Kagera Regions



Mean of psychological well-being in Mwanza and Kagera



Appendix B: Self-Checklist Questionnaire

Section A: Respondent Characteristics

Kindly, you asked to provide your information regarding on the following attributes. Please be honest to fill or select the appropriate characteristic that fits you.

Name (Optional): _____ Age _____ Sex: Male _____ Female _____
 Marital status: Single _____ Married _____ Widowed _____ Separated _____ Divorced _____
 Education level: Primary level _____ Secondary level _____ college/university level _____
 Occupation: _____ Mobile: _____ Number of family members: _____ Number of dependants _____ Average monthly income/consumption in TZS _____

Section B: Questionnaires for Self-Checklist for Psychological Limiting Factors

Please tick the rating column using number from 1 to 5, describing from 1 strongly disagree and 5 strongly agree, such that the provided reason (s) for effect of psychological of the production on economic growth in Tanzania (for the particular factor/variable).

Rating level: 1) Strongly disagree; 2) Disagree; 3) Neutral 4) Agree; 5) Strongly agree		1	2	3	4	5
Factor /latent variable causes (From conceptual framework (Fig.2.1))						
2.1 Demographic Characteristics	2.1.1: Age is a factor that psychologically affects a family income productivity					
	The current age encourage to work for future					
	2.1.2: Marital status is a factor that psychologically affects family income productivity.					
	It is better to be married					
	It is better to be single					
	Widowed are hardly meet the daily basic needs					
	2.1.3: The number of family members is a factor that psychologically affects a family income productivity					
	The number of family members more than 5 is preferable					
2.1.4: The income level is a factor that psychologically affects family income productivity.						

	The current level of family income is satisfactory					
	The current source of family income is reliable					
	2.1.5: The educational level is a factor that psychologically affect a family income productivity					
	The current level of education is satisfactory					
2.2 Environmental Factors	2.2.1: Environmental sustainability behaviour is a factor that psychologically affects family income productivity.					
	It is better to preserve the forest at the surrounding					
	Not encouraged to pollute either of land, air or water					
	2.2.2: Social awareness on environmental issues is a factor that psychologically affects family income productivity.					
	The culture of preventing environments affects the production level in a family.					
	2.2.3: Environmental Policy is a factor that psychologically affects family income productivity.					
	It is not encouraged to use wood fuel than other energy sources					
	It is better to be guided on use of land and water resources					
	2.2.3: The environmental regulations/rules are factors that psychologically affect family income productivity.					
	It is regrettable to be punished by breaking the law					
	It is better to be bound by rules on environment conservation					
2.3 Human Behaviour	2.3.1: Lifestyle is a human factor that psychologically affects family income productivity.					
	Pain is general avoidable and happiness is encouraged in daily life					
	Rashness and irresponsibility in public life is encouraged					
	Preference of values and personal needs are encouraged in life					
	2.3.2: Motivation is a human factor that psychologically affects family income productivity.					
	This location/region is conducive for work.					
	The government motivates the people to work.					
	2.3.3: Metacognition is a human factor that psychologically affects family income productivity.					
	A defined person and knowledgeable to success					
A person with a defined way of achieving the goals						
2.4 Economical Factors	2.4.1: Price of commodity is a factor that psychologically affects family income productivity.					
	The price of commodities is fair/affordable					
	The price of commodities are changing faster					
	2.4.2: Fashion of product is a factor that psychologically affects family income productivity.					
	It is desirable to get new design of material/assets					
	Beauty and prestigious material/assets are persuadable					
	2.4.3: The unforeseen weather is a factor that psychologically affect family income productivity					
	It is worse when the favourable condition changes to bad					

Why to Kiss Sleeping Hero

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Abstract

The present paper researches the role of collective/historical memory in forming separatist feelings of the ethnic group. It tries to answer the question whether collective memory is something immutable in time and passes unchangeably from one generation to another or it undergoes transformation in accordance to the events occurring within the ethnic group or around it. Political elite's role in transformation of collective memory by applying historical records is also an interest of the research. We investigate the case of Abkhazia, a breakaway region of Georgia, with the method of the semi-structured interviewing, narrative-recording and analyzing archival materials to show when and why the political elite activates history to form/transform collective memory. The interviewees were the former incumbents from both sides Abkhazian and Georgian, representatives of the universities and middle class, ordinary people, and IDPs. Analysis comprise interpretation of the perceptions of the respondents on the interethnic conflict. The elaboration of interview-narrative material demonstrates that the most memories associated with the cases and periods of oppression, repression and humiliation from the both sides are revived and instrumentelized by the political elite in the critical political and economic moments.

Keywords: memory, collective memory, historical memory, political elite, secessionism, Georgia, Abkhazia

Introduction

Common history of the distinct ethnic group along with, “elements of distinctive culture” and sense of territorial association, is among the powerful primordial markers (Smith 1991). It promotes ethnic group solidarity to mobilize for collective action and achieve specific political goals, i.e., autonomy or full sovereignty on the territory of residence (Rabushka, Shapsle 1971, Tilly 1998). The new era began after collapse of the Soviet Union for all the Soviet Republics. Post-Soviet period was struck with powerful movements of ethnic revival simultaneously with political and economic deterioration. Ethnic confrontations tensed immensely in some of the Post-Soviet republics (Hale 1998, Treisman 1997, Zurcher 2007). Armenia and Azerbaijan (Nagorno-Karabakh conflict), Georgia (Georgian-Abkhazian, Georgian-South Ossetian conflicts) and Moldova (Transdnistria conflict) were stuck with intermittent violent and frozen conflicts ended by creation of the quasi-states. Nowadays, Ukraine completes the list with its eastern regions in fire and Crimea grabbed away with irredentical action (Ambrosio 2016).

Emphasizing heavily the victorious/oppressive moments in ethnic group's history is disseminated among the group members and forms specific collective memory (Bikmen 2013). As soon as this type of memory crystalizes, it is utilized as a waterproof evidence to justify inevitability of independence through separation. The process of memory creation is observed in *pre-* and *post-* ethnic-conflict-periods. Pre-period of confrontation is marked with exploiting special historical events, persons, historical architecture (legitimatizing distinct land ownership), symbols, ancient scripts to explain initiation of the belligerent actions toward another *ethnie* (Jedlicki 1999). History is revived again after the end of violent clashes, namely, during the frozen period of contention or successful separation. Now conflict-time glorious or tragic episodes are added to already known history as a valid proof of worthy fight for freedom (Devine-Wright 2003).

In the present paper we made efforts to assess the role of historical memory in forming separatist feelings of the distinct ethnic group and solidifying group members for concrete collective action. Pushing forward the specific historical periods or glorious/devastating events has far going purpose. History serves as a strong pillar that supports one and the foremost interest shared by the group – separation (Olson 1965).

We seek the answer to the question whether collective memory as predecessor of historical memory is something immutable in time unchangeably passing from one generation to another or it undergoes transformation in accordance to the events occurring within the ethnic group or around it. The second question follows the first. Who is the initiator of transformation of collective memory thus altering historical memory? To say in another words, who revives definite historical events or heroes, ethnic community or political elite? Involvement of the political elite seems to be essential, as it is perceived as a carrier and interlocutor of ethnic collective memory - myths, legends, pivotal historical events, heroes and etc. (Toft 2003). Political elite fully intitles itself to set ethnic group's political goals (Dutter 1990, Frombgen 1999). Modification of the historical moments is among other means to satisfy its ambitions and achieve established targets – autonomy or secession (Laitin 1995).

Our research studies Abkhazian case to display the role of history in formation of collective memory by political elite and the ways it is defused through Abkhazian ethnic. Abkhazia's case satisfies Halbwachs' condition - small society residing border territory remote from the capital city of the central state, Georgia (Halbwachs 1966). Abkhazians make small-size community almost fully isolated from Georgia rest from 1993.

The research is qualitative and uses semi-structured interviewing and narrative recording methods along with archival material to gather necessary information. The interviewees were the former incumbents from both sides (Abkhazian and Georgian): representatives of academic field, middle class, ordinary people, and Internally Displaced Persons (IDPs).

Historical Memory is an Effective Instrument

George Orwell (1949) said: “He who controls the past controls the future. He who controls the present controls the past.” The events memorized today are historical memory tomorrow. Collective memory of the *ethnie* formed on the grounds of the altered historical episodes in this particular moment turns into transformed history for future generations.

Collective memory is a package of the memories of an individual who lives, works and thus constantly interacts with other members of the community (Halbwachs 1966). Through oral or written communication an individual's fragments of memory regarding some significant events associated with the community's life is passed from the interlocutor to the listener. If the listener encounters his friend or associate, he becomes interlocutor and shares story to the person he met. The process of interchanging of information goes on and new narrative is spread through the whole community. Individuals belong to the society and they construct their memories in association with other persons. The socially constructed memory now belongs to the group of people and is assembled from different memories like pieces of the puzzle (Halbwachs 1966). If individual's memory and collective memory “are primary design of the present and its structure”, historic memory is defined as a “reconstruction of past by historians whose craft leads them to deviate from or to question accepted values (Halbwachs 1966). Pierre Nora (1989) agrees with Halbwachs (1966) and defines historical memory as historians' collective memory. Correspondingly, this type of memory is analytical and critical compared to collective memory of community that does not always depict reality or copy-paste historic episodes. It uses two sources for cultivation: individual memory and historical memory or history itself. For dissemination of crystalized collective memory any type of social networking is useful. Collective memory is not immutable. It undergoes transformation when the ontological setting alters. In most of the cases political elite is an initiator of the change. The high office holders are motivated to refresh collective memory when they face either political or economic crisis or there is a strong pressure from outside. In the concrete situation the new narrative is formed through communication of the state/authority and citizens (Hoph 2005). In the process of forming/transforming collective memory the creators are not interested in history itself. They use historical records to interpret the past events as the patterns analogous to those in present. Collective memory is used to fill the empty space between memory and history. When it is necessary, the political elite in the role of *prince* decides to kiss sleeping beauty, history, to awake only those episodes that exaggerate the moments of glory or grievance. In other words, the political elite chooses specific historical moments, selects the events vital for the given circumstances and decides which one has to be remembered or forgotten.

In a small isolated society, it is very easy to disseminate information via face-to-face communication. Mundane interaction promotes creation of “communicative or everyday memory” (Assman 1995) which on its turn constructs the full package of collective memory comprised of the separate segments of the communicative memories.

Everyday communication has two dimensions: horizontal and vertical. Horizontal communications are mainly informal and outreach the members of family, relatives, neighbors. The novelty is spread via any digital social network horizontally as well. Lederach (1996) divides society into three horizontal levels: the bottom level (grassroots), middle level (academia, professional unions, church and etc.) and the last, top level (elite, in our case political elite). The dissemination of the changes in collective memory on the second and third levels are either formal (schools, universities, formal quasi-state organizations and etc.) or informal (church, associations, NGOs, personal communications of the officials and so on). The exchange of purposely created narratives i.e. a process of formation/transformation of collective memory is continuous. During construction of it the new episodes in accordance to emerged situation or challenges are added. New flows of collective memory propagate in two directions: from top (political elite) to bottom (grassroots) and bottom-to-top. The middle level accumulates, filters and refines new memory additions and conveys them in either direction (Lederach 1996).

If on the grassroots level collective memory is mainly spread in oral format through informal, mundane communication; on the second and third levels the forms of dissemination diverse. The printed narrative is distributed via journals or newspapers, the just uncovered historic moments are televised make it formal, legitimate and long-term. Involvement of the second and third levels into process of transformation of collective memory guarantees long life to it, thus for future generation it will serve as a trustworthy historical memory.

To summarize, all three levels participate into formation/transformation of collective memory with its own specific function: the top level determines its priorities and tries to connect it somehow with the kin ethnic group's preferences. When the task seems hard to fulfill, the incumbents put immense effort to transform the group's needs and make it more coherent to their own interests. In the circular motion (top-to-bottom and bottom-to-top) the middle level has an utmost significance. It elaborates political elite's (top) desires and at the same time gathers information about grassroots' dispositions. In the most cases, the representatives of the middle level are the family members, relatives, acquaintances or coworker of either grassroots or top levels. Thus, for them it is accessible to listen and comprehend political elite's goals, as well as ordinary people's concerns. When middle level possesses all the information from both levels, top and bottom, it seeks solution via bringing top's interests and bottom's concerns closer. Only after that it advises political elite what direction collective memory has to be transformed. The best scenario is the coincidence of the top level's preferences and grassroots demands. It simplifies middle level's mission. The representatives of this level select those historical episodes that justify the political elite's actions. Worse scenario emerges when the incumbents' interests deviate from what the bottom level needs. In this situation the middle level faces hard challenge: to find the historical records of the events that can help the political elite legitimize the dissent decisions. If it is impossible then middle level rewrites some of the records and transforms historical event to persuade majority of the population that acceptance of the concrete decision was inevitable even though the representatives of the bottom level were not enthusiastic about it.

Below is discussed the analysis of the recorded narratives and semi-structured interviews. It demonstrates the role of the political elite in forming/ transforming collective memory to achieve set goals by utilizing historical records and altering historical memory.

I. RESEARCH ANALYSIS: WHAT IS REMEMBERED AND WHAT IS FORGOTTEN

During the fieldwork almost three hundred narratives were recorded. The interviewees were Georgians (mainly *Mengrelians*¹), some of them still live in their own places in Abkhazia (Gali and Ochamchre districts) and IDPs in Georgia rest, Abkhazians mostly residing on the Abkhazian territory and few in Georgia rest. They were asked to recall the significant moments of Abkhazian history, the events preceding the conflict (1992-1993), occurred during the hot phase of the conflict or in the period of the frozen conflict and 2008 Russo-Georgian war (Abkhazians call it Abkhazian-Georgian war). The respondents of the semi-structured interviews were the representatives of academia from both ethnic groups. The questions were related with controversial interpretations of Abkhazian history, its instrumentalization for formation/transformation of collective memory and the ways and reasons of creation a fundament for new historical memory.

The analysis of the gathered field records shows that either the same event is perceived and interpreted differently by both, Abkhazians and Georgians, or they remember different historical moments that comprise their collective memory to legitimize their sometimes-belligerent actions.

The narratives and interview answers are dichotomized into two categories: what events are remembered and what moments are forgotten by both ethnic groups. The most of the memories are associated with the moments of oppression, repression and humiliation conducted by the both sides either during Soviet times or ethnic confrontation.

Table 1 gives some examples of the major historical events emphasized in the narratives with Georgian and Abkhazian interpretations.

Table 1: The interpretations of the major historical events by Georgians and Abkhazians

Major Event	Abkhazian Interpretation	Georgian Interpretation
Year of 1866 - the third wave of Mohajir exile to Ottoman Empire by Russian Tsarist army	Authority of Gubernia (province) of Georgia supports Georgian (Mengrelian) new settlements on the territory of Abkhazia that gradually creates demographic domination of Georgians.	Russia depopulated the territory of Abkhazia; policy to establish Russian settlements in Abkhazia appeared to be unsuccessful.
Period of 1917-1936 – Abkhazia is independent Soviet Republic	The status is granted to the region automatically as Russian Empire collapses.	(a) Newly formed sovereign Georgia grants status of autonomy to Abkhazia and it's named as

¹ Georgians living in the western part of Georgia in the region Samegrelo and across Abkhazia's border on Abkhazian side.

		autonomous Abkhazia (not state, not republic) (1917); (b) Three Republics - Georgia, Armenia, Azerbaijan, forms Transcaucasian Federation; Abkhazia is never mentioned as Soviet Republic, with same status as other three (1921-1936)
1930s-40s	(a) Central state demands applying Georgian as a language of instruction in schools officially and unofficially at working places; (b) Abkhaz were fired because of their ethnic belonging or speaking Abkhazian; (c) Severe oppressions from Georgian side explain why Abkhazians prefer speak Russian more than Georgian.	The repressive machine was functioning on the whole territory of the USSR and Georgians were as much repressed as other <i>ethnies</i> .
Mid of 1950s, 60s, 70s, 80s	Abkhaz omit these decades at all.	Abkhaz dominate in all spheres of activity (political, economic, and cultural) on the whole territory of Abkhazia.

Grassroots memories of the violent conflict of 1992-1993 period also diverse. In his interview Abkhaz veteran says:

"I saw how an old man was tortured (by Georgian troops), just here in Anua-Arhu² ... It was clear that there was no way to avoid war, that we had to arm ourselves. And for that, you must sacrifice all... unfortunately! I wouldn't want to talk about the details about this war, but it always reminds me of itself, every day. Those who have been in war would understand me... deep in the heart it never ends."

Here is an excerpt from Abkhaz elderly woman's narrative:

"Every day we get older and older and our wounds are still open. It's impossible to forget. Yes, life has improved, but deep in heart our lives have not become better. Every day it is getting worse and worse, because every day we lose a fighter or two or three. Every year we lose somebody. And it becomes more and more painful for us, more and more painful. The most important thing is that our children understand at what price this victory came to our hands."

A middle-aged Georgian woman tells the story how his neighbor witnessed mass execution of Georgian men on the stadium in Gagra³. Another Georgian woman recalls that she lived in the block of flats in Sukhum⁴ (Georgian version - Sukhumi). Her neighbors belonged to different ethnicities. Despite this they lived friendly and peacefully.

Almost every Abkhaz who fought in the *Fatherland War* (so Abkhazians call the conflict of 1992-1993) underline brutality of Georgian *Nationalists* (*every Georgian in Abkhazia is assumed to be Nationalist*). Georgians who participated in the same violent conflict (*civil war*, as Georgians name it) on the territory of Abkhazia believed that they were protecting their own land and the fight was just and legitimate. The Georgian representatives of the second and third levels apply historical records in their rhetoric to validate ownership of that particular piece of land. They repeatedly blamed *Nationalist* Abkhazians who were backed by Russia in instigation of ethnic confrontation. Abkhazian political elite (top level) with support of academia (middle level) in the public speeches underlined that Abkhazian history had proved that the territory of Abkhazia never belonged to Georgia. Both sides were sure they had legitimate right to fight for restoration of historical justice.

The memories of the representatives of the middle level (academia) sound quite similar. The pre-war memory of the lecturer (ethnically Abkhaz) from Abkhazian university remembers how her Georgian students demonstrated an unacceptance of her as a lecturer.

A quote from her interview:

"I worked there (at the University in Sukhum) more than one year already. They (Georgian students) found out that I am Abkhaz. My last name is J. (sounds like Georgian last name), but they sniffed out that I am Abkhaz and they simply declared a boycott on me. They said at the very first lecture: "We will not listen to her", just like that "We will not listen to her, she is Abkhaz".

² Abkhazian village in Ochmchire district

³ Gagara – city in Abkhazia

⁴ Sukhum (Sukhumi) – capital city of Abkhazia

Ethnically Georgian Professor of history at the same university reminiscences his negative experience with Abkhazian students blaming him in falsification of Abkhazian history. The professor recalls:

“Abkhaz students asked the Dean to replace me, because they did not trust my interpretation of history of Abkhazia, calling it official Georgian narrative. After helping them with consultations to pass final exams, they approached me, thanked and apologized. I was their teacher. I forgave them with smile and understanding that they were young and had right to make mistakes.”

These narratives give insight on the early stages of the confrontation before interethnic conflict erupted. All the episodes demonstrate multicultural composition of Abkhazia and the problems related with different languages, ethnic backgrounds, though the major issue of contention was - which ethnic group had to dominate?

The Abkhaz high officials time after time send signals to the middle level representatives to construct more efficiently Abkhazian nation-state with the functional formal and informal institutions. Education has a crucial role in formation of new generation. New textbooks especially history books convey the patriotic stories of Abkhaz heroic fighting for independence. A prominent Abkhazian professor in her work writes:

Today Abkhazia possesses all attributes of statehood. These attributes were adopted before the violent conflict. And they are: state flag, anthem, emblem and so on. Abkhazia has isolated territory and the nation have been forming on it during centuries. Today formal declaration of sovereignty is not enough. The problem of statehood of new Abkhazia is to strengthen and defend itself from military attacks. We have to work hard to create stable economy, establish functional executive, representative and judicial system. (Pilia 2005)

Pilia's (2005) argument on historically established Abkhazian state is supported by Derluguian (2001). He states that institutionalization of Abkhazian political identity is commenced in 1925 when Abkhazian constitution was adopted. This historical fact was effectively used by Abkhazian political elite when decision on starting of the war was made. The creation of plenty of national symbols for strengthening banal nationalism on the grassroots level (Billing 1995) has been a part of nation-building activity. The top and middle levels cooperated efficiently in the process. The incumbents decide what historical norms should govern nowadays' lifestyle, what and why has to be remembered or forgotten (Torja 2015), what historical episodes has to be prioritized. The statement goes along with Nora's view, that remembering past determines present identity (Nora 1989) of the ethnic group.

Interview- and narrative-analysis shows that Abkhaz ethnic group's identity is affected by the memory of past events, mostly associated with the memories of violence. People recover from the actual atrocities, though they do not necessarily forget them and move on; instead, they commemorate these tragic events time after time (Pennebaker & Banasik, 1997). High officials revive and fuel periodically anti-Georgian abhorrence by forming/transforming collective memory. Last thirty years of pre-, during and post-conflict periods prove that the most effective mechanism to solidify Abkhaz ethnic group is creation of collective memory that is nourished by two sources: victory in the Fatherland War and hatred towards Georgians. As soon as this antagonism subsides, top level sends messages via public speeches or controlled mass media to the second level to activate historical resources and supplement collective memory of the bottom level with new tragic memories. In the small and isolated society, the process undergoes easier and faster. Success of it is guaranteed as the former incumbents move down and join the middle level after resignation; at the same time the representatives of the last are often appointed in the high offices. This circular motion is an additional mechanism to the Lederach's triangle that promotes collective memory transformation and its dissemination.

On the Table 2 is given a list of the persons who were representatives of academia and later became high political officials or visa-versa.

Table 2. The list of Abkhazian Politicians/Academic Personal

Politician/Academic Personal	Book Title	Publication date	Main Accents in the Book
Vladislav Ardzinba (The first president of Abkhazia in 1994-2005)	<i>Мы шли на смерть, чтоб жить.⁵</i> <i>(We Were Going to Meet Death to Survive)</i>	2001	Book contains Ardzinba's interviews and public speeches. It depicts the events occurred in 1992-2005 period. The pig portion of the book is dedicated to the war for independence. He underlines the role of leader in decision-making process. <i>Major narrative: Georgians are aggressors, Russia supports Georgia.</i>

⁵ http://apsnyteka.org/867-ardzinba_v_my_shli_na_smert_chtoby_zhit.html (13.01.2021)

Stanislav Lakoba (The secretary of security council of Abkhazia in 2011-2013)	<i>Ответ историкам из Тбилиси (документы и факты)</i> ⁶ (<i>The Response to the Historians from Tbilisi (Documents and Facts)</i>)	2001	Main accent is on Abkhaz identity, statehood, and sovereignty ambition. The book depicts Abkhaz history and group's development. He tries to prove that Georgian historians' argumentations on Abkhazia is not correct. <i>Major narrative:</i> Georgians purposely oppressed Abkhazians during centuries to maintain dominance.
Viacheslav Chirikba (The minister of foreign affairs of Abkhazia in 2011-2016)	<i>The Georgian-Abkhazian Conflict: In Search of Ways</i> ⁷ II.	2008	Abkhaz language does not belong to the same group of languages as Georgian. Abkhazians have their own historical development and culture. They never associate themselves with Georgians. If not considering short intervals, Abkhazia had strong statehood with high level of political autonomy. <i>Major narrative:</i> Georgians always tried to diminish Abkhazian identity, suppress Abkhaz culture and slow down independent development. "Abkhazians are the victims of both Russian and Georgian Imperialism" (Chirikba 2008).
Tamara Shakril (political and social activist)	<i>Aspects of Georgian-Abkhazian Conflict</i> ⁸	2001	Application of Georgian alphabet and language by Abkhaz elite does not demonstrate that the whole nation was involved in Georgian-Abkhazian politico-cultural space. It can be assumed that the same Abkhaz elite use Latin, Russian or other European alphabets. <i>Major narrative:</i> Debate between Georgian and Abkhazian academia on the issues of Abkhazia's historical development, statehood, identity and etc. "We Abkhazians, they Georgian" (Shakril 2001)

Conclusion

Historical memory creates solid fundament for ethnic identity. History itself nourishes collective memory composed by individuals' everyday memories spread via communication. The research aimed to show that collective memory is not immutable; it is formed and transformed. The process is continuous as political elite exploits it for its own interests and benefits any time it needs to mobilize and solidify ethnic group around common idea supported by collective memory. The architects, of collective memory, representatives of the middle level, use specific historical events, new details are added or omitted from the historical records and only after that they are interpreted skillfully to the whole population. Major initiator of transformation of collective memory are the representatives of the political elite (top level).

The analysis of the interviews and narrative shows that Abkhazian society does not make even an increment effort to overcome trauma and enjoy better life. The situation is strictly controlled by the authority and in case if there is slightest diminish

⁶ http://apsnyteka.org/1730-lakoba_s_otvet_istorikam_iz_tbilisi.html (13.01.2021)

⁷ <https://abkhazworld.com/aw/conflict/731-the-georgian-abkhazian-conflict-chirikba>

⁸ <https://www.peacebuilding.uci.edu/files/progs/pdfs/russian5.pdf>

of antagonism towards Georgia, the machine of creation/transformation of collective memory is started. The same happens when political elite faces politico-economic crisis or pressure from outside. Abkhazian government constantly underlines in public speeches victory in Fatherland War. Georgians aggressive actions and attempts to dominate are validated by historical records. History was applied to form 90's collective memory of Abkhazian society to prepare it for bloody conflict.

Unfortunately for Abkhazians, the quasi-state is recognized only by Russia and few small countries. Population is frustrated as economic development is not observed, political institutions do not function properly. Life Standard is low. Any time population expresses discontent political elite utilizes again collective memory to explain the difficulties in governing.

Isolation and size of Abkhazian society promotes formation/transformation of collective memory. It's easy to spread the information that cannot be checked or annulled just because there is no alternative source of information. Size of the society appears to be significant as it strengthens top-down and bottom-up motion of intellectuals (ideology architects) mostly from academic middle class. They are appointed on political positions and after resignation move back to their academic field. They carry distinct historical narratives when move up and bring back transformed one to share it with family, relatives, neighbors. The memorized story is then retold to wider network of individuals. Step by step the transformed history spreads first vertically and then horizontally. Individual memory serves as a foundation for collective memory. Later, established collective memory turns into "legitimate"/true historical memory that is kissed and awoken anytime at service of political elite's interests and benefits.

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