STIPENDIUM HUNGARICUM
PhD Student Conference 2022

CONFERENCE PAPERS
from the 1st Stipendium Hungaricum
PhD Student Conference

STIPENDIUM HUNGARICUM

Tempus Public Foundation

Ministry of Foreign Affairs and Trade of Hungary

INTRODUCTION

The Stipendium Hungaricum scholarship programme was established by the Hungarian Government with the aim of promoting the internationalisation of Hungarian higher education and attracting top foreign students from around the world. Each year, thousands of students choose to study in Hungary where they can establish personal and professional connections while enjoying high-quality education in the heart of Europe.

On July 7, 2022, the first Stipendium Hungaricum PhD Student Conference was held. The conference brought together scholarship holders pursuing doctoral studies in Hungarian higher education institutions, who presented their research across a range of scientific disciplines. These disciplines included Animal Science, Art History, Assyriology, Biophysics and Toxicology, Business and Management, Civil Engineering, Housing Market, International Relations, Mental Health of Youth, and Teacher Education.

This pioneer conference volume consists of ten scientific papers that were selected from the first Stipendium Hungaricum PhD Student Conference. Our primary goal in publishing these papers is to provide a platform for doctoral candidates to present their research, share their scientific findings, and initiate dialogue among students and researchers from various disciplines.

CONTENTS

THE IMPACT OF STRATEGIC LEADERSHIP ON THE ADMINISTRATIVE EMPLOYEES PERFORMANCE IN THE MINISTRY OF EDUCATION IN JORDAN

Senan Amer
University of Miskolc, Faculty of Economics

István Kunos
University of Miskolc, Faculty of Economics

ABSTRACT

Appropriate strategic leadership is essential in an organization's decision-making to ensure short-term success and long-term sustainability in the current unstable business environment. This study aims to understand the effect of strategic leadership on the Administrative Employees' performance in the Ministry of Education in Jordan. For this study, the dimensions of strategic leadership involved Strategic Orientation, Transformational Leadership, and Innovative Leadership. The study community represents the administrative employees in the MOE. A descriptive survey design was used. Respondents were the employees and managers of the Ministry of Education in Jordan. The collection of primary data was done through a structured questionnaire.149 questionnaires were distributed among the study sample, of which 100 were returned and analyzed. This implies that 93% of the questionnaires account for the data generated in this study. Descriptive statistics (standard deviations, percentages, and mean) were used in the analysis. Pearson correlation analysis was also performed to determine the level of the relationship between strategic leadership and administrative employees' performance in the MOE.

KEYWORDS:
- STRATEGIC LEADERSHIP
- STRATEGIC ORIENTATION
- TRANSFORMATIONAL LEADERSHIP
- INNOVATIVE LEADERSHIP
- EMPLOYEE PERFORMANCE

1. INTRODUCTION

The continuous development of leadership is due to the organizations' relentless pursuit of facing unexpected and unknown events which requires the presence of strategic leaders who possess high skills of creative thinking to envision the reality of their organizations and its future goals. The success of organizations is closely linked to the availability of strategic leaders who can influence workers, deal with the environmental conditions surrounding their organizations, and establish a culture of change. The latter is done through changes in the organizational structures, introduction of updated working methodology and the use of modern technology. Furthermore, a strategic leader should be able to keep pace with environmental changes and to maintain the organization's survival in the face of the challenges posed. Strategic leadership focuses on the most important leadership capabilities of general managers and executives at the upper and middle management levels in profit, non-profit and governmental organizations. In order for the organization to remain successful, various ways of thinking about the method of

mobilizing and providing services is required by the strategic leader. Another important trait required is the investing capabilities achieved by engaging workers in important strategic dialogue that can contribute to mobilizing efforts. This mobilization of efforts and the enhanced thinking abilities of workers results in achieving targets on the right time and at the required speed. Strategic leadership is a set of decisions that changes almost everything according to the future vision of the organization due to the leader's skill of assessing the variables and achieving qualitative leaps in work and results. It is important to realize that strategic leadership is not the ability to make big speeches or succeed in winning people's admiration by being charismatic. Instead, strategic leadership is about achieving results and not merely acquiring good qualities but also putting those qualities at work. The strategic leader plays a fundamental role in guiding the organization towards achieving its goals, hence playing a role in defining the quality of performance. Administrative staff and the formation of an effective work team depends on the extent of the strategic leader's ability to direct and exploit human capabilities for the better and impose justice in the work environment. Since Jordan is part of the global environment and hence it is affected by it, the country is witnessing various environmental shifts and changes that affect its public and private organizations alike. This study focuses on the impact of strategic leadership on the performance of employees in the Ministry of Education in Jordan.

KEY ISSUE OF THE STUDY

Strategic leadership needs the skill to fit in the short-term and long-term ideas of the firms (Hitt, et al. 1994). Strategic leadership generates an exclusive relation between the inactivity of Weberian-style government and disorder. To gain the ways strategic leadership affects organizations, it is useful to discuss organizations as compound adaptive systems with strategic leadership providing the stability between stability and instability (Boal &Schultz, 2007). The objective of any organization is not only to persist but also to endure its existence by refining performance. In order to meet the needs of the highly inexpensive markets, organizations must repeatedly increase performance. So, there is a need to study more the role of leadership in employee performance. Work engagement is a concept that captures the difference across persons and the amount of energy and devotion they pay to their job. Strategic decision-making in the Ministry of Education is not up to the spot, which is producing low employee performance due to less work engagement between the employees. The leadership style that characterizes the strategic leader is the main factor in guiding the course of the institution, developing its performance, and achieving its goals, The pattern of effective leadership behavior often shows its effect on the behavior of administrative employees and their effective performance, as it is reflected in their morale, and their satisfaction with work. The key issue of this study is to reveal the extent of the impact of strategic leadership on the performance of employees.

IMPORTANCE OF THE STUDY

The importance of the study flows from the importance of the topic it deals with, and this is reflected in the following:

- To highlight the impact of strategic leadership on the performance of administrative staff at the Ministry of Education in Jordan.
- To contribute to enhancing the impact of strategic leadership on the performance of administrative employees at the Ministry of Education in Jordan by means of the attained results.
- To submit a set of suggestions that contribute to strengthening future studies in studying the impact of leadership strategy on the performance of administrative staff.

SIGNIFICANCE OF THE STUDY

The objective of this study is to establish the influence of strategic leadership on the performance of administrative staff at the Ministry of Education in Jordan. This study can link the theoretical influence of relating strategic leadership with the performance of administrative staff through work engagement. The study outcome may also be used for the improvement of the performance of administrative staff in Jordanian organizations.

METHODOLOGY

For this study, the researcher used a descriptive-analytical method and field study method. The researcher developed a questionnaire based on previous studies and a literature review of the subject, statistical analysis of the answers was done and the validity of the hypothesis was tested. Additionally, the researcher also used existing references and ready sources to the pedestal of the theoretical framework, linking the results of the current study with the results of previous studies related to the subject. This link was interpreted to arrive at an authentic scientific description of the phenomenon and provide the results, according to which some of the recommendations are proposed by the researcher.

POPULATION OF THE STUDY AND ITS SAMPLE

The study community is represented by the Ministry of Education in Jordan, as the ministry is among the organizations in which strategic leadership practices emerge clearly, which helps to conduct the study. The sample members are the employees and managers who can provide useful information for the study. 100 questionnaires were distributed to the specified sample: 50 to managers and 50 to staff.

STUDY MODEL

The current study model was developed based on the Kitonga et al. 1997 model, and on the previous literature review of studies.

The theoretical framework of the study is to explore the impacts of strategic leadership on the employee performance of the employees who work in the Ministry of Education in Jordan. strategic leadership is an independent variable (strategic orientation, transformational leadership, and innovative leadership) and the dependent variable is employee performance. *Figure (1)* shows the study model.

Figure 1. study model, Source: The preparation of the study model was based on the previous literature

STUDY HYPOTHESES

To answer the study questions, the following main hypothesis was formulated:

HO1:
There is no statistically significant effect of the factors influencing strategic leadership (Strategic Orientation, Transformational Leadership, Innovative Leadership), at $\alpha \leq 0.05$, on employee performance. The following sub-hypotheses emerged from the main hypothesis:

HO1.1: There is no statistically significant effect of Strategic Orientation at $\alpha \leq 0.05$ on employee performance.

HO1.2: There is no statistically significant effect of transformational leadership at $\alpha \leq 0.05$ on employee performance.

HO1.3: There is no statistically significant effect of Innovative Leadership at $\alpha \leq 0.05$ on employee performance.

2. LITERATURE REVIEW

2.1 Strategic leadership

Strategic leadership is concerned with making strategic decisions related to the product and service provided by the organization and the market while simultaneously selecting competent executives. It is further concerned with finding the source of funding, making decisions for the organization, drawing goals, improving the direction of the organization while respecting its nature, developing and designing infrastructure such as components, information, and control systems as defined by the various parties that deal with the organization. These parties include the financial institutions, the suppliers, the workers and the customers. Strategic leadership also negotiates with each side of these parties. (Shrivastava& Nachman,1989). According to Hosmer, 1982, strategic leadership is to influence the decisions of others voluntarily thus increasing the likelihood of the organization's long-term success and achieving the required growth. Strategic leadership is the ability to deal with many variables and ambiguous circumstances through the crystallization of direction indicators, vision, and executable and flexible strategy. Strategic leadership represents the ability of individuals to think and influence others in a way that enables the organization to obtain a competitive advantage (Vera & Crossan, 2004). Strategic leadership refers to the ability of understanding the main elements of creative strategic thinking, understanding the steps in the creative planning process and its implementation as well as understanding and writing down a strategic plan. (Adair, 2002). Strategic leadership plays an influential role in the process of implementing the strategy through many leadership practices or actions (Covin, & Slevin, 2017). Strategic leadership depends on strategic analysis and planning based on the logic of strategic thinking. It is characterized by the clarity of the future vision based on future orientalism and seeks to achieve effectiveness and efficiency within the organization. This is achieved mainly due to the relationship between goals and available opportunities, and by adopting innovation and creativity. Putting the organization in the foreground, which is more extensive than the traditional leadership, focuses on operational plans in the face of immediate events only, and adheres to the work instructions and procedures. (Guillot, 2003).

2.1.1 Strategic Orientation

Strategic Orientation is a fundamental variable in the business world, as it is related to the way the organization chooses to remain active and competitive in the business environment. Strategic direction stems from the results of strategic thinking which manifests in directing the organization's management in defining its strategic goals. It gives priority to goals, organizational survival, social responsibility, and growth within the framework of long-term strategic vision (Chaganti & Sambharya, 1987). According to Gatignon & Xuereb, 1997, Strategic Orientation is determining the organization's long-term position in a competitive environment by focusing on resource allocation. Strategic orientation is one of the processes of strategic management. It cannot be counted as a separate stage, but it overlaps in all strategic management processes (Day & Wensley, 1983).

2.1.2 Transformational Leadership

Leadership is of great importance in the success of any organization as it is the essence of the administrative process. A competent leader exercises his role skillfully and with ingenuity and tries to choose positive leadership styles that are appropriate to the conditions of administrative work (Bass & Avolio, 1990). Leadership is necessitated by interactions between individuals and groups. The leader is like a watchdog, an organizer who directs individuals on their behavior, and their attitude towards certain common goals that the organization aims to achieve without being prejudiced to public order

or law or customs and traditions (Keller, 1992). In the modern era, changing and the way to lead it successfully has become one of the most important topics that occupy the mindset of administrative leaders. This is due to the fact that change occurs everywhere, and that its speed increases and it makes processes complicated thus making the future of organizations and their success dependent on a leader's approach towards change. Educational institutions need educational leaders to form a clear future vision for institutions, to adopt a strategic plan for developing and managing change, avoiding crises, and to keep pace with modern developments and trends in information and communication technology (Young, 1991).

2.1.3 Innovative leadership

According to (Bel, 2010), innovation leadership is defined as leadership that encourages individuals to innovate and evaluate their performance and responsibilities in a clear way. It further supports important achievements and creates an atmosphere that encourages innovation and exploratory research. A leader is someone who leads a group of individuals effectively towards a specific goal, hence the leader must be distinguished through their technical, organizational and intellectual qualities and skills. These skills help the leader influence the behavior of the followers and accelerate the achievement of the goals of the organization. (Bossink, 2004). Innovative Leadership is considered the meeting point of innovation, creativity, talent, planning, and development. An innovation leader has the ability to share new ideas with each other, organize interconnected relationship, and make a platform for innovation and creativity (Elkington & Booysen, 2015). Innovation leadership prepares work teams and creates an innovative work environment within the organization. An innovation leader is always interested in discovery and renewal in order to find the best and fastest ways to achieve goals. Entrepreneurial spirit and the ability to

consciously and quickly act in various locations are some distinguishing characteristics of an innovation leader. An innovative leader is open to change and can anticipate the future. He has a desire to learn about internal problems and issues to solve them through brainstorming sessions, keeping pace with developments, and continually learning (Tung & Yu, 2016).

2.2 Employee performance

The content of employee performance refers to obtaining specific facts and data about the employee's performance to help him analyze, understand, and estimate the level of performance and give the individual a certain standard that is required to be reached. Employee Performance also aids in understanding the employee's task-conducting behavior i.e., estimating the level of technical and scientific competence to fulfill the duties and tasks (Ahmed, et al, 2013). According to Bedarkar & Pandita, 2014, employee performance is defined as the employee's implementation of work and responsibilities assigned by the institution or the entity. It further refers to the specific results of the behavior, and in return, the negative performance is the undesirable consequence that determines the behavior. Hameed & Waheed, 2011 defined employee performance as the extent to which the workers or employees achieve the desired goals effectively and as desired by using the available resources. Anitha, 2014 refers to the term performance in the following words: "It is not permissible to confuse behavior with achievement and performance, because behavior is what individuals do in the organization in which they work. Achievement is what remains of the impact or results after individuals stop action, that is, it is an output or results. As for performance, it is the interaction between behavior and results that have been achieved together". Task performance and its evaluation are important processes on which an organization relies a lot for judging the extent of its success in achieving the short-term

and long-term goals. It is a concept that links the aspects of activity and the goals that the organizations seek to achieve through the tasks and duties performed by the workers. Therefore, task performance is the process by which officials realize the level of individuals' task performance and their ability to accomplish a task efficiently. (Locke et al, 1984). The concept of performance includes other criteria in addition to efficiency and effectiveness such as employee turnover rates for the same jobs, the volume of accidents related to production, and problems related to employee commitment, for example, regularity at work and implementing health and safety procedures accurately and professionally. (Berry & Broadbent, 1984). Most management scholars stressed that we must differentiate between the terms "behavior", "achievement" and "performance". According to these scholars, behavior is what the individual does in the organization in which he works, and achievement is the output or results already achieved. Lastly, performance is the interaction between behavior and achievement, and it refers to the way in which the actions assigned to individuals are executed procedurally – it is the sum of the behavior and the results achieved together. (Seta, 1982). Contextual performance is the behavior that contributes to increasing organizational effectiveness by providing a good environment for performing work tasks (Scotter et al 2000). Johnson, 2001 defined contextual performance as behaviors that do not support the technical essence of the organization but instead support the psychological and social environment in which the technical operations take place. According to Devonish & Greenidge, 2010, contextual performance is defined as a set of personal and optional behaviors that support the social and motivational context in which organizational work is accomplished. Contextual performance has two aspects; the first relates to facilitating interpersonal relationships, which describes behaviors that are personally directed towards co-workers and that contribute to

achieving organizational goals. These include encouraging cooperation, respect for others and building effective relationships. The second aspect relates to dedication to work, which describes motivational measures towards self-discipline, such as working hard, taking initiatives, following rules and policies, supporting organizational goals, and allocating time for business success.

2.3 The relationship between strategic leadership and employee's performance

This research focused on strategic leadership and its role on employee performance in order to understand the role of strategic leadership in the organizational context. The contribution of this research in the field of strategic leadership is multifaceted in enhancing employees' awareness of strategic leadership and evaluating the factors that contribute significantly to changing their outlook of the strategic leadership. It further explained that strategic leadership can motivate workers in the organization by placing them in a position from where the organization can develop strategic leadership to gain a competitive advantage in this field. (Hitt & Duane, 2002). There is a positive relationship between strategic leadership and employee performance, and it can be analyzed at the following levels (Abbas & Yaqoob 2009):

- A strategic level for senior management to determine the production mix and the strategic direction of the organization in general.
- The strategic and functional level of the middle management to achieve a competitive advantage.
- The operational strategic level of the lower management to significantly increase resource productivity.

3. ELIABILITY OF THE STUDY TOOL

Cronbach alpha test was used to measure the reliability of the measurement tool. The value

of the questionnaire as a whole was = 95.80% which is an excellent rate, higher than the acceptable rate of 60%. Also, the value for each variable was calculated as follows:

Table 1. Reliability Test "Cronbach alpha"

Variables	Coeffient of consistency (∝ value)	Numbers of Items	Sample
Strategic leadership	91.56%	5	
Strategic Orientation	95.88%	4	
Transformational Leadership	93.82%	5	100
Innovative Leadership	84.77%	5	
Total index of study tool items	96.68%	19	

Table (1) indicates that the Cronbach Alpha coefficient of dimensions ranged between (84.77%) and (96.68%), all of which are values higher than the acceptable rate of 60%.

3.1 Result of the study

The normal distribution of the collected data was performed to confirm whether the data was under normal distribution or not, skewness values were derived, which indicates that if the values of the torsion coefficient are less than (1) then the data is distributed naturally. *Table (2)* shows the torsion coefficient of the study variables.

Table 2. Normal distribution of data based on torsion coefficient

Variable	Strategic leadership	Strategic Orientation	Transformational Leadership	Innovative Leadership	Employee Performance
Skewness	0.811-	0.956-	0.924-	0.759-	0.771-

The test data shown in *Table (2)* indicates that the data distribution was normal, where the values of the torsion coefficient were less than (1) for all variables of the study, as explained by the theory (Central Limit Theorem).

Table 3. Results to test the correlation strength between independent variables

Strategic leadership	Tolerance	VIF
Strategic Orientation	0.440	2.274
Transformational Leadership	0.487	2.054
Innovative Leadership	0.484	2.068

Table (3) indicates that the allowable variance coefficient for independent variables was less than 1 and greater than 0.01. Contrast inflation coefficient values were less than 10, which indicates that there is no high correlation between the independent variables. This further indicates the acceptance of values and it is suitable for conducting multiple linear regression analysis and thus testing the main study hypothesis.

Table 4. Correlation Analysis

		EP	SO	IL	TEL
Employee performance	Pearson Correlation	1			
Strategic Orientation	Pearson Correlation	0.719*	1		
Innovative Leadership	Pearson Correlation	0.666*	0.780*	1	
Transformational Leadership	Pearson Correlation	0.721*	0.829*	0.742*	1

Table (4) indicates that there is a positive and significant relationship among each dimension of strategic leadership. Similarly, it also indicated that all the dimensions have a positive and significant relationship with employee performance. Transformational Leadership has the strongest and most significant relationship with employee performance while innovative leadership has the most moderate relationship. To examine further, regression analysis is conducted to establish which types of leadership style is most influential in improving the employee performance.

3.2 Regression Analysis

In this research, regression is used to envisage the impact of strategic leadership on employee performance, in this case referring to the **Ministry of Education in Jordan**, based on three independent factors. They are Strategic Orientation, Innovative Leadership, and Transformational leadership. Employee performance is the dependent factor in this context.

Table 5. Model Summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin–Watson
1	0.762[a]	0.580	0.561	0.4369	1.67
a. Predictors: (Constant), Strategic Orientation (SO), Innovative Leadership (IL), , transformational leadership (TEL).					
b. Dependent Variable: Employee Performance (EP).					

The Adjusted R Square value at 0.561 indicated that the model is not a good fit model as the value is lower than the rule of thumb of 0.60. The Durbin Watson value indicated that there is no autocorrelation among the selected respondents for this research as the value falls in the range of 1.5-2.5. However, since the model is close to 0.6, the model is accepted for further analysis.

Table 6. Regression Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.410	0.221		6.377	0.000
	Strategic Orientation	0.234	0.112	0.280	2.089	0.039
	Innovative Leadership	0.139	0.092	0.166	1.520	0.031
	Transformational	0.222	0.112	0.288	1.985	0.050
a. Dependent variable: Employee performance						

According to *Table 6*, Strategic Orientation beta value is 0.280 with a significant value of 0.039 which is lower than the rule of thumb. Hence Strategic Orientation is found to have a positive and significant impact on employee performance. Similarly, Transformational Leadership has a beta value is at 0.288 with a significant value of 0.050 which is lower than the rule of thumb. Hence Transformational Leadership is also found to have a positive significant impact on employee performance. Innovative Leadership shows a beta value of 0.166 with an insignificant value of 0.031, indicating that Innovative Leadership has a positive and significant impact on employee performance.

4. CONCLUSIONS AND RECOMMENDATIONS

This study has investigated the effect of strategic leadership style on employee performance in the Ministry of Education in Jordan. The researcher draws clear conclusions from the great importance of strategic leadership style, which appears in every variable of the research. This study makes use of a survey research design, and a random sampling technique was used to select 100 respondents from each ministry. All data collected were analyzed based on descriptive and inferential statistics to verify demographic variables and research hypotheses. The study found that there were no statistically significant differences between the study sample individuals of the relationship between strategic leadership style and employees' performance in the Ministry of Educations in Jordan. The finding of this study and the recommendation were discussed. The results of the study showed that the degree of importance is high for all study variables and to varying degrees between variables. This explains the importance of all study variables from the point of view of the study sample. The following points show the results of testing the hypotheses related to the model used in the study.

The study concluded that there is a statistically significant effect of the strategic direction on the performance of the administrative employees in the Ministry of Education in Jordan. This indicates the existence of a strategic direction in the Ministry of Education in Jordan as the Ministry seeks to clarify the strategic direction amongst its employees. The study also found that Transformational Leadership at the Ministry of Education in Jordan was effectively practiced. This was due to the interest of managers to change and improve the situations in the departments, which reflected Transformational Leadership does affect employee performance. The results of the analysis concluded that the degree of Innovative Leadership practiced was moderate. The study showed the Ministry's interest in innovation and renewal and honoring its employees who innovate new methods of doing work. The study also found that Innovative Leadership has a positive effect on administrative employee performance. Based on the results of this study, the following recommendations are made:

• There is a need to intensify efforts to pay attention to the strategic direction at the Ministry of Education in Jordan, to improve the organization's direction with respect to its nature, and to establish and design infrastructures such as components, information, and monitoring systems.

• Role of Transformational Leadership should be activated to improve the current situation, support management in this area that would result in improved performance levels of administrative employees.

• Supporting the organizational culture to enhance an employee's sense of belonging to the organization, where they work based on an important criterion that is based on the values, trends, and objectives of the organization. All of this reflects in the performance of employees.

• The management must continue to encourage employees to innovate and create new ideas that would cause employees to increase their sense of responsibility.

• Further studies can be extended in different cities to check the generalized effect of strategic leadership across the country. Researchers may check the effect of strategic leadership in other industries to generalize the effect.

FUTURE RESEARCH

The current investigation demonstrated that strategic leadership is important in enhancing employees' performance as well as employee satisfaction. However, the research is not without certain limitations. One of the limitations is that in this research, we check the impact of strategic leaders on employees' performance which has been testified using a sample of respondents from top and middle level managers of the Ministry of Education in Jordan. Further studies can be extended in different cities to check the generalized effect of strategic leadership across the country. The research was conducted in the Ministry of Education in Jordan, it better the research conducted in other parts of Jordan. Conducting further research by those interested in this field with studying other variables affecting the employees' performance management process or studying the variables that were studied in other sectors such as the industrial, commercial sectors, or other service sectors or uses a wider range of samples from different types of educational institutions.

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A CASE STUDY OF SEISMIC VULNERABILITY ASSESSMENT OF RESIDENTIAL URM BUILDINGS BASED ON RAPID VISUAL SCREENING IN GYŐR, HUNGARY

Nurullah Bektaş
Széchenyi István University, Department of Structural and Geotechnical Engineering

Orsolya Kegyes-Brassai
Széchenyi István University, Department of Structural and Geotechnical Engineering

ABSTRACT

Masonry buildings have been constructed since ancient times using materials such as stone and baked or unbaked bricks. The existing URM (unreinforced masonry) buildings which make up most of the European building stock was constructed before the current regulations. Since the resilience of these buildings to an impending earthquake is uncertain, they should be examined by implementing an appropriate seismic risk assessment technique in terms of time and accuracy to identify seismically hazardous buildings. In recent earthquakes, damage of URM buildings indicates that existing buildings should be examined using RVS (rapid visual screening) methods, which is one of the pre-earthquake seismic assessment methods. RVS methodologies are utilized to examine the large building stock in a relatively short time compared to detailed seismic assessment methods. In this study, 20 URM buildings from Győr as a representative sample of Hungarian residential URM building stock have been examined to identify the buildings in need of further detailed seismic examination based on FEMA P-154 rapid visual screening methodology.

KEYWORDS:

- PRE-EARTHQUAKE
- RAPID VISUAL SCREENING
- MASONRY BUILDINGS
- INNOVATIVE LEADERSHIP
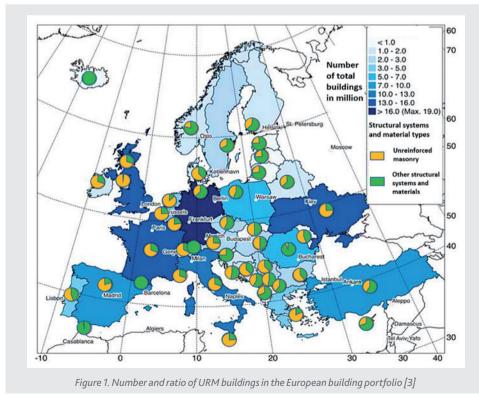- SEISMIC VULNERABILITY ASSESSMENT

INTRODUCTION

The seismic capacity of the buildings constructed without considering the seismic design regulations and of the constructed buildings based on lower seismic norms is uncertain to be within the acceptable range. In this manner, existing buildings located in seismically hazardous locations pose significant threats to the community and consequently to the economy. Matthys and Noland stated that more than 70 percent of the building portfolio in 1989 all around the world consisted of URM buildings [1]. Despite the fact that the ratio of URM buildings to existing building stock has varied over time, there are still a considerable number of URM buildings. URM buildings account for a substantial portion of the European building stock. In this manner, the ratio of URM buildings to other building stock in European nations, and the number of buildings in each nation is depicted on colored country maps as shown in *Figure 1*. In this context, the devastating effects of an earthquake could be mitigated by performing seismic risk assessment prior to an imminent destructive earthquake, identifying the buildings that require comprehensive seismic assessment procedures to assure public safety.

When the time came to the selection of the seismic risk assessment methodologies to determine damage states of the selected building stock, there are primarily three types of seismic assessment methodologies ranging from the most detailed to simplest: (1) detailed vulnerability assessment (DVA), (2) preliminary vulnerability assessment (PVA), and (3) rapid visual screening (RVS). These methodologies are implemented to identify earthquake-prone buildings in seismically hazardous locations. DVA methodologies (e.g., incremental dynamic analyses (IDA), cloud method, pushover analyses, etc.) are implemented to examine building in a more consistent way. In terms of the accuracy of the methods to reflect real behavior of the engineering structures, IDA is the most suitable because consisting of a variety of ground motion and scaling of them. Some analysis techniques, such as the finite element method, require more time to analyze a building. The necessary time for design professional civil engineers to conduct DVA assessments increases in direct proportion to the number of DVA analyses performed. This necessitates the employment of more civil engineers who have specialized in structural design. Structure-specific information (drawings, loads, configuration, material strength) is collected during the PVA stage, and either structural safety identification or the collected information is used to implement DVA methods. RVS, which is the simplest method to examine an existing building, is capable of examining a large building stock in a shorter time than DVA method. The RVS methods-based examination of each building by trained screeners takes 15 to 30 minutes from the street without entering the building. Detailed seismic assessment methods should be applied for the limited number of seismically hazardous buildings, which are classified as a result of rapid visual examination [2]. Since detailed seismic risk assessment methods are computationally

Figure 1. Number and ratio of URM buildings in the European building portfolio [3]

expensive and complicated, using simple models is of great importance for rapid visual examination.

The use of URM buildings for various purposes as well as having an important place as a cultural symbol could cause cultural and economic damage to societies as a result of the loss of these structures in an impending earthquake [4]. Therefore, the aim of this paper is to evaluate vulnerability assessment of the 20 URM buildings as a sample of Hungarian building stock and provide a sample of the implementation of the rapid visual screening methodology.

GYŐR AS CASE STUDY AREA

Győr, which is located halfway between Budapest and Vienna, is at a location where the roads between the east and the west of Europe connect. In terms of the number of historic buildings, Győr is the second-largest city in Hungary [5]. It is also the most important city in terms of social, educational, industrial, and economic activities in northwest Hungary [6]. Győr, which is also known as "the city of the corner balconies", is a Hungarian city that has preserved the Medieval and Baroque style city system. At the end of the 1970s, the restoration of historical buildings in the city center began. The city of Győr has been selected for a sample implementation of RVS because of the huge number of URM buildings in the existing building stock. Some of these buildings are part of the cultural and historical heritage.
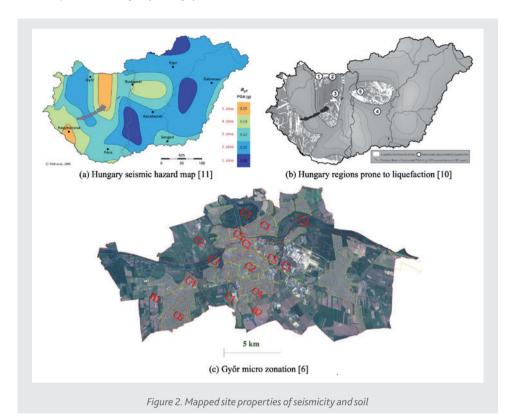
Seismicity and Soil Characteristics of the Region

In 455, an earthquake of magnitude bigger or equal to M6.0 occurred near Savaria in Western Hungary [7]. It was stated that the return period of M6.0 and M6.5 earthquakes in Szombathely region is between an interval of 1000 to 3000 years [7]. The 1763 Komárom earthquake, which is thought to have a moment magnitude between 6.2 to 6.5 interval, was the most destructive earthquake occurring in the Komárom District of the Hungarian Kingdom [7, 8]. This earthquake had a scale of IX in Komárom and VII-VIII in Győr based on the European Macroseismic Scale. Contemporary studies on the level of damage resulting from this earthquake indicate that severe damage occurred after the earthquake. In this earthquake, it is reported that 63 people died in Komárom, 4 people died in Győr, 102 people were injured, and 7 churches and 279 houses were completely destroyed, while 353 buildings were partially destroyed [7, 8]. As a result of the 1763 Komárom earthquake, 91% of Komárom's building stock was affected to various damage levels, ranging from minor damage to complete collapse [9].

The seismicity of Hungary is shown in *Figure 2 (a)* as 10% probability of exceedance in 50 years and return period of 475 years of peak ground acceleration [10]. In addition, shows the (1) Komárom (1763), (2) Komárom (1783), (3) Mór (1810), (4) Kecskemét (1911) and (5) Dunaharaszti (1956) earthquakes epicenter and liquefaction areas with white dots [10]. It has been stated that M6 earthquakes in the Pannonian region, which has a moderate level of seismicity, have a return period of 100 years, and M5 earthquakes have a return period of every 20 years [8, 10].

The seismicity of Győr based on the peak ground acceleration with 10% probability of exceedance in 50 years and 475 years return period is reported as 0.12 g on the seismic hazard map as shown in *Figure 2 (a)*. The impact of the same earthquake on the same structures varies in different local soil conditions due to amplified seismic accelerations from bedrock to surface depending on the site soil properties. Therefore, it is important to take site soil conditions into account when evaluating structures for seismic vulnerability. Based on *Figure 2 (c)*, the site soil type for the buildings under consideration is categorized as type C, which is classified in the interval of 180 – 360 m/s shear wave velocity [12]. Even as can be seen in the F*igure 2 (a)*, seismicity

(a) Hungary seismic hazard map [11]

(b) Hungary regions prone to liquefaction [10]

(c) Győr micro zonation [6]

Figure 2. Mapped site properties of seismicity and soil

of Győr classified in a single seismic zone, Kegyes-Brassai et al. [8] stated that since Győr consists of different soil profiles, it enables the formation of different seismic zones (eight zones C: 1-6, B: 1-2) with a verity of risk amounts as shown in F*igure 2 (c)* [5].

CHARACTERISTICS OF BUILDING STOCK

In this study residential URM buildings are considered as a sample representative of Győr, Hungary building stock as shown in *Table 1*. In these buildings, each story consists of one or two flats [5]. In urban areas, there are 3-4 story buildings as well as free-standing buildings. These URM structures are mostly utilized for residential purposes, although they are also used for commercial, government, educational,

and administrative purposes. The load-bearing system of these URM buildings differs depending on when they were constructed. Initially, timber materials were used to construct the flooring of URM structures. However, floors have been constructed with reinforced concrete since the 1960s [5]. The masonry buildings in Győr are constructed without using reinforcement. Residential buildings usually consist of single or two-story flats. The existing URM buildings in Győr are built without using a common wall in between, each of them has a separate exterior wall on the side of the adjacent building. However, since the pounding effect was not considered when constructing these buildings, no space was left between the outer walls of the buildings. If URM structures are not constructed based on higher standards and are not well detailed during structural design, they may not perform as anticipated during an impending earthquake

[13]. Because two-thirds of Győr's population live in URM buildings that might be seismically hazardous in an impending earthquake, as explained in the section Seismicity and Soil Characteristics of the Region. Therefore, URM buildings should be assessed using RVS techniques to determine potential loss of life and property. Particularly the buildings within the medieval city walls are susceptible to lateral dynamic loads [5].

DESIGN METHODOLOGIES OF URM BUILDINGS

The seismic performance of a structure during an earthquake varies based on the building's design configuration [14]. Depending on the local application characteristics, the structural design varies. Except for design limit states, the current force-based limit state design method does not demonstrate the desired strength in design. In

Table 1. Sample of URM buildings from Győr

this context, structures to be built in earthquake-prone areas should be designed and built based on current standards in order to accomplish the stress requirements that would arise during an earthquake. The design approaches for URM structures are based on the masonry building type categorization. The next paragraphs give a detailed explanation of the aspects of both newly constructed URM buildings, and masonry heritage buildings. The building configuration is the most general classification aspect of URM buildings. The seismic performance of URM structures is proportional to their size and shape [14]. The buildings can be classified based on the topology, architectural characteristics. Story height, number of stories, and building footprint are main characteristics that vary from one building to another. The buildings are classified based on the number of stories and height because the amount of the lateral and axial loads in walls are directly related to these parameters. In addition, building footprint as another parameter is used to classify masonry buildings based on their unique topologies.

Because of the brittle behavior of the URM buildings, they are not safe during earthquakes. Seismic performance of masonry buildings can be enhanced by the use of horizontal bands to maintain box action. The masonry buildings generally constructed by using four types of bands: roof band, lintel band, plinth band, gable band and sill band as shown in *Figure 3*. Roof band is constructed at the top of the walls and is not needed in the case of the reinforced brick or reinforced concrete roof formation. Lintel bands are constructed above doors and windows. Bending and pulling effect could be observed in the lintel bands during an earthquake. These bands could be constructed by using reinforced concrete, and wood [15]. Plinth band is constructed at the bottom of the walls in the weak soil conditions to prevent collapse because of the foundation settlement. In case of stronger site soil properties plinth band is not required. Gable bands are used in the case of the sloped and pinched roof formation. Gable bands should be formed to be continuous with the roof band as shown in *Figure 3*. They transfer roof load to roof band, limiting out-of-plane gable wall failure [16] and subsequent roof collapse. Sill bands are constructed at the bottom and top of the windows openings to support load concentrations in the wall. These bands could be useful in preventing the further development of vertical and diagonal cracks by reducing the effective height of piers [16].

The bands described above connect various walls at various levels and boost durability by offering higher structural integrity against earthquakes in masonry buildings. Because they provide horizontal framing systems, these bands
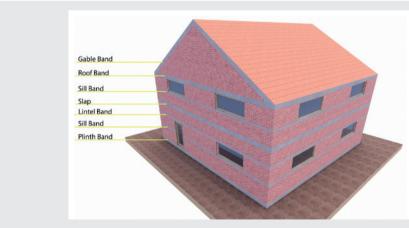

Figure 3. Horizontal bands in URM structural system

enable that horizontal shear stresses are safely distributed to the walls. Previous earthquakes (such as 2015 Gorkha Earthquake in Nepal, 2017 Lesvos Earthquake in Greece) have shown that masonry buildings constructed with bands perform better in earthquakes [17]. Furthermore, the earthquake resilience of new structures has been improved by the use of a novel band type known as gabion band in buildings constructed following the 2015 Gorkha, Nepal earthquake [18]. Although only reinforced concrete bands are illustrated in *Figure 3*, durability of masonry buildings is enhanced by constructing bands with diverse materials such as timber and bamboo.

In terms of load-carrying characteristics, floors, which are the horizontal load-bearing components of masonry buildings, are classified as rigid, semi-rigid, and flexible in their own planes. Flexible floors are composed of unstiffened wood and iron beams, semi-rigid floors are built of hollow clay tiles and iron beams, and rigid floors are made of reinforced concrete [19].

In addition to the information provided above, row buildings have a common wall that separates them. Isolated buildings are those that stand alone, with space between them. The pounding that happens when there is insufficient amount of space between adjacent buildings is more effective in the reinforced concrete story level diaphragms of URM buildings than in the timber story level diaphragms [20]. Buildings can be classified as row buildings and isolated buildings.

SEISMIC VULNERABILITY ASSESSMENT METHODOLOGIES

Seismic vulnerability assessment methods are used to identify structural vulnerability and associated damage states (or safety levels) of the considered buildings. In this manner, seismic vulnerability assessment methodologies consist of rapid visual screening (RVS), preliminary vulnerability assessment (PVA), and detailed vulnerability assessment (DVA). In the phase of seismic vulnerability evaluation, material properties of the building, geometric properties of the structure, quality of appearance, seismicity of the region and site soil conditions are considered to provide demand capacity relation to identify structural safety level.

DVA assessment methodologies (simplified modal as a linear static, multi modal analyses with response spectrum as a linear dynamic, pushover as a nonlinear static, and nonlinear dynamic analysis, etc.) are classified in mainly two subtitles: dynamic analysis methods (linear and nonlinear) and static analysis methods (linear and nonlinear). The main nonlinear dynamic analyzes methods employed in the literature are incremental dynamic analysis (IDA), cloud method, stripe method, and endurance time method. IDA method consists of a set of ground motions and implemented by scaling the selected ground motion data to selected intensity measure-based target intensity measure values. In FEMA 695 [21], 22 far-field ground motion data suggested to utilize for implementation of IDA method. In the literature, IDA is identified as the most accurate methodology in terms of reflecting real structural response. Also increment amount of the number of ground motion data directly affect the accuracy of this method. Another DVA method is cloud method, which consists of more ground motion data than IDA, however, cloud method used ground motion data without scaling. Therefore, cloud method implementation comparatively decreases necessary time to perform analyses. The accuracy of the method is directly related to the number of earthquake data and spreading of unscaled data intensity measure values. Out of these methods, there is endurance time method, which uses a single endurance time function for DVA. In addition, there is stripe method, which consists of multi-stripe and single-stripe based on scaling of selected ground motion data set to identify structural vulnerability. The other commonly used method is the static pushover analysis. Static pushover analysis implemented based on the mode shapes of the building in

consideration. Although static pushover analysis may not reflect structural system behavior as accurate as dynamic methods, it is computationally time-accurate when compared to dynamic methods.

Another step of the seismic vulnerability assessment methodologies is PVA (such as FEMA 310 [22], JBDPA [23], ASCE 41-17 [24], etc.), implemented when more detailed vulnerability assessment is required as a result of RVS implementation. PVA methodology is based on configuration and strength checking steps. PVA consists of collecting drawings, structural elements, size identification, load evaluation, material properties evaluation based on the non-destructive testing methods, structural configuration check to identify deficiencies and stiffness base check. Non-destructive testing methods are implemented to identify current material properties of structural components such as steel, concrete, reinforcement, masonry and so forth. For the site soil properties, classification geophysics methods need to be applied. Based on the above collected structural characteristics, if further investigation is needed, DVA methods could be implemented.

The other most simple methodology is the RVS method, which has frequently been used to categorize large building stocks in municipalities and cities in terms of damage states categories. RVS methods can be used easily and without requiring any calculation. The most frequently used RVS methods are American RVS methods FEMA P-154 [21 – 23], European methods EMS-98 [28] and RISK-UE [29], Italian method GNDT [30], Canadian method NRC [31], and so forth.

Since previous work of authors [3] discussed all the RVS methods developed throughout the world and compared the most commonly used ones in terms of the considered parameters, the following paragraph discusses the FEMA RVS method employed in this study.

The most widely used method is the FEMA RVS. FEMA 154 [26] RVS methodology was initially published in 1988 as "Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook". FEMA methodology revised in 2002 as FEMA 154 [27] based on the lessons learned from the devastating earthquakes occurred in 1990s. The final version of the FEMA RVS was published in 2015 as FEMA P-154 [25]. FEMA P-154 method consists of Level 1 and optional Level 2 screening forms different from FEMA 154. FEMA P-154 [25] method Level 1 screening forms are based on the scoring system, which consists of basic score, vertical and plan irregularities, precode, post benchmark, site soil type, and minimum score. The final score is evaluated based on the determined forms in terms of site seismicity and the building type as shown in *Figure 4* as a sample FEMA RVS implementation. The Level 2 screening form mainly consists of structural score modifiers (vertical irregularity, plan irregularity, redundancy, pounding, etc.) and observable nonstructural hazards (location, exterior, interior, and estimated nonstructural seismic performance). The final score is in the interval of 0-7. When final score value increases, the safety level of the building also increases. When the final score is less than or equal to 2, as a "cut-off" score the considered building should be assessed by a design professional with
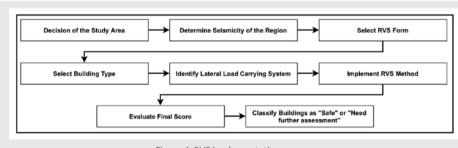

Figure 4. RVS implementation process

using detailed seismic assessment methods. FEMA P-154 [25] stated that a rapid visual inspection of each building would take between 15 and 30 minutes without entering the building. Furthermore, as given in FEMA P-154 [25], the following steps are time-consuming, which must be done to the implementation of the RVS method:

- 8 to 40 hours for RVS cost calculation,
- 8 to 12 hours for selecting the RVS screening form and making the required adjustments, as well as determining the publication dates of the relevant seismic codes,
- 6 to 8 hours for training of screeners per person,
- 15 to 75 minutes for collecting and reviewing the building stock information prior to the implementing of RVS method per building,
- 5 to 10 minutes for quality assurance per building, and
- 15 to 30 minutes for processing data obtained as a result of fieldwork per building

The main parameters that have a significant effect in determining the final score of the considered existing buildings based on the FEMA P-154 [25] Level I RVS forms are explained one by one as follows:

Building Type: FEMA considers 17 different building types. Because the structural system is frequently hidden behind architectural coatings, the building type required for the implementation of the RVS technique is identified through a comprehensive analysis (identification) procedure. In this instance, in addition to exterior and interior building screening, an experienced design professional might identify the building type by reviewing the existing structural drawings.

Basic Score: RVS forms provide the basic score values derived for different building types. The basic score, which varies according to the seismicity zone, reflects the probability of collapse of the building when the building is excited by the maximum considered earthquake. Consequently, score modifiers are added or subtracted from the basic score to determine the final score value.

Pre-Code: The pre-code is considered as a score modifier if the screening building was designed and built prior to the initial adoption of seismic design regulations.

Post Benchmark: The post benchmark score modifier is used if the assessed building is designed and built after the significantly improved seismic design standard.

Soil Type: In RVS forms, the site soil characteristics are taken into consideration since the duration and amplitude of the shake are dependent on the site soil properties up to bedrock. Because the RVS forms' score modifiers are derived by assuming soil type C and D, score modifiers for soil types C and D are not provided. Therefore, score modifiers for soil types A, B, and E have been identified. On the other hand, the RVS technique could not be used to evaluate a building when the site soil type is F.

Minimum Score: When the RVS final score becomes negative, indicating that there is a greater than 100% chance of damage to occur. Because a structure's collapse probability cannot be more than 100%, the minimum score value, which is determined based on the basic score, structural irregularities, and building age, is added. As a result, if the final score is less than the minimum score, it is accepted as equal to the minimum score.

Irregularities: Irregularities are divided into two main parts as vertical irregularities and plan irregularities. Vertical irregularities consist of the sloping site, weak and/or soft story, out-of-plane setback, in-plane setback, short column/pier, and split levels. The sort of weak and/or soft story plan irregularity arises when there are less walls or columns in a story than others. Commercial parts of buildings have large windows for display purposes, which causes weak/soft story irregularity. If the height of one of the stories is relatively higher than the others, it causes the formation of vertical irregularity. The main types of plan irregularities are torsion, non-parallel systems, reentrant corners, and diaphragm openings. Because the street facades

of the shops mainly consist of windows, torsion-type plan irregularity could occur. In buildings located on street corners that do not align at a 90-degree angle, torsion may occur due to plan irregularity. Buildings with the shapes E, L, T, U, or + are irregular in terms of plan. Because openings in the diaphragms have an adverse influence on the distribution of seismic stresses to the vertical parts of the structural system, plan irregularity arises. To eliminate plan irregularity, the beams on the building's façade must be aligned with the columns.

RESULTS AND DISCUSSION

In this study FEMA P-154 Level 1 screening form is employed systematically as shown in *Figure 4* to determine damage state of the selected existing URM buildings in Győr. To apply the FEMA P-154 RVS technique, 20 URM buildings with a number of floors ranging from 1 to 6 stories are chosen as a representative sample of the Hungarian residential building stock. Moderate RVS form of FEMA P-154 as can be seen in *Figure 5* is selected based on the seismicity of Győr, Hungary as shown in *Figure 2* (a). The main parameters, which effected the final RVS score, are building type, vertical irregularity, plan irregularity and pre-code. The irregularities in buildings (plan and vertical), and updates in seismic design regulations [32], cause buildings to be classified as seismically deficient. In the RVS form, basic score is equal to 1.7, and minimum score is equal to 0.2 for URM buildings as can be seen in *Figure 6*. The mapped soil type for Győr region by Kegyes-Brassai [6] as shown in the *Figure 2 (c)* is used to identify soil type of induvial building's area based on ASCE 41-13 [33] to consider soil type modifier. In this study, damage potential categorization is based on the association with final score values obtained by applying the FEMA P-154 RVS method, as given in *Table 2*.

Table 2. Damage potential and RVS final score relationship [34]

RVS final score		Damage Potential
S < 0.3	:	High probability of Grade 5 damage: Very high probability of Grade 4 damage
0.3 < S < 0.7	:	High probability of Grade 4 damage: Very high probability of Grade 3 damage
0.7 < S < 2.0	:	High probability of Grade 3 damage: Very high probability of Grade 2 damage
2.0 < S < 2.5	:	High probability of Grade 2 damage: Very high probability of Grade 1 damage
S > 2.5	:	Probability of Grade 1 damage

Damage state classification of considered existing URM buildings based on the FEMA P-154 final RVS score based on the limits of damage states defined in the *Table 2* are provided as below:
- 3 buildings in High probability of Grade 4 damage, very high probability of Grade 3 damage
- 17 buildings in High probability of Grade 3 damage, very high probability of Grade 2 damage

Figure 5 shows percentage of irregularity type parameters in the considered URM buildings. 30 percent of the buildings have vertical irregularity, 50 percent of the buildings have plan irregularity, 15 percent of the buildings have both plan and vertical irregularities, and 35 percent of buildings do not have vertical and plan irregularities as shown in *Figure 5*.

Figure 5. Plan and vertical irregularities percentages of buildings

Buildings having a final score larger than the "cut-off" value, which is recommended as 2, are

seismically safe and therefore could perform as desired in an impending earthquake, according to FEMA P-154. Buildings with final scores lower than the "cut-off" score must be examined by an expert design engineer using more detailed vulnerability assessment methodologies. In this study, for all the considered URM buildings' final score is less than the "cut-off" score. In this context, it is estimated that the majority of URM buildings in the city of Győr could be seismically unsafe based on the findings of RVS implementation. Three buildings (15% of buildings), which have both plan and vertical irregularities, in this research had a final score of less than 0.7. In this manner, findings indicate that DVA of these three structures is required as noted by Sinha and Goyal [2].

Figure 6. A sample implemented FEMA P-154 RVS form

CONCLUSION

RVS methods, which consider site seismicity and soil properties to select screening form, are quick and effective ways in terms of identifying the buildings that require further seismic assessment. The seismicity of the region, building characteristics, URM design techniques, and seismic vulnerability assessment methodologies are extensively presented. Implementation of RVS methods helps to classify buildings in terms of seismicity levels. In this context, RVS methodologies are utilized to decide seismic vulnerability mitigation strategies based on their safety levels. This paper presents a representative implementation of the traditional RVS method, FEMA P-154, for the seismic assessment of 20 URM buildings of Győr as a sample of the Hungarian building stock. The majority of the existing URM structures investigated in this research did not design or construct employing seismic design techniques.

The findings to identify building damage potential by the implementation of the RVS technique demonstrate: (I) 15 percent of the buildings have a high chance of grade 4 damage and a very high chance of grade 3 damage, and (II) 85 percent of the buildings have a high probability of grade 3 damage and a very high probability of grade 2 damage. Based on consideration of the "cut-off" score recommended in FEMA P-154 for the examined URM buildings, further detailed seismic analyses are necessary because the final score values of all buildings are less than 2. The results show that the FEMA RVS method is conservative. Because, even for a single building, the implementation of the detailed seismic assessment methodologies could be computationally expensive, it is suggested to use DVA (detailed vulnerability assessment) methods to identify the safety level of the three buildings (15% of the selected buildings), which are classified in high probability of damage grade 4 and very high probability of damage grade 3.

Possible life and property losses could be estimated by implementing RVS methodologies. Therefore, the results of the study conducted by implementing FEMA RVS to Győr URM buildings are important for authorities to implement further studies and take necessary precautions. Finally, it is suggested that DVA methods could be used in future studies to examine the accuracy of RVS methods and propose necessary improvements.

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PSYCHOLOGICAL SYMPTOMS AND SENSE OF COHERENCE IN YOUTH

Olney Rodrigues de Oliveira

University of Szeged, Doctoral School of Education

INTRODUCTION

A crucial question for psychological health is the ability to maintain oneself in balance and coherent in a worldwide society while facing so many transformations. The effect of the complex changes in living conditions besides the high-speed information provided by internet connection enhances a lack of coherence, a circumstance that may result in mental health problems (Kristensson & Ohlund, 2005). Youth who handle demands and expectations coping appropriately with developmental tasks will be more resilient and successful than their peers (Lackaye & Margalit, 2006). Salutogenesis, a model proposed by Antonovsky that focuses on the assets for health, contributes a theoretical framework and useful resources to help with daily stressors and to maintain psychological wellbeing among children and adolescents (Kristensson & Ohlund, 2005). This model investigates the protective factors of health in youth. When individuals have proper and well-coordinated generalized resistance resources (GRR) during childhood and adolescence it will result in a sound sense of coherence (SOC) (Antonovsky, 1979, 1987). GRR refer to all resources that assist an individual, a group, a community or a society to improve the way that stressors are handled, and as a consequence, sense of coherence is enhanced (Antonovsky, 1987). Some examples of GRR are material resources (money), intelligence (information), ego identity, self-esteem, cultural background and religion (Antonovsky, 1979, 1987).

SOC can be understood as a characteristic of personality represented by adaptability (Antonovsky, 1979, 1990; Eriksson & Lindstrom, 2006), as an internal strength (Lundman et al., 2010), or a positive way of thinking, feeling and behaving. A sound SOC results in successful use of resources in the face of adverse circumstances (Antonovsky, 1987), a positive emotional and cognitive evaluation of the relationship between the individual and his habitat (Margalit & Eysenck, 1990) or a combination of points of view about oneself and the world (Antonovsky, 1987, 1991). SOC is the consequence of the interplay between the individual and the environment affected by social and cultural contexts, education, sex and ethno-racial background (Grayson, 2007). Three dimensions compose the sense of coherence: comprehensibility (the ability to have a cognitive understanding about the problem to be solved), manageability (the ability to manage the resources to solve the problem), and meaningfulness (the ability to be motivated and make emotional investment to solve the problematic situation). The association between health and SOC in adolescents is reported to be identical as in adults (Eriksson & Linström, 2006).

SOC promoting factors are associated with the process of development during childhood and adolescence (Antonovsky, 1987), with learning processes (Lindstrom & Eriksson, 2011), and with life experiences (Antonovsky, 1979). Childhood and adolescence are considered crucial stages for investigating the development of SOC (Evans et al., 2010; Marsh et al., 2007). There

are several studies exploring sense of coherence in adolescence (e.g., Moksnes et al., 2012, Blom et al., 2010, Edbom et al., 2010) but less during childhood (Al-Yagon & Margalit, 2006; Honkinen et al., 2009). Sense of coherence seems to be lower in adolescence than in earlier ages, which is probably due to fluctuations, transitions and challenges occurring in this period. Adolescence is characterized by rapid and turbulent bio-logical, social, psychological and self-concept transformation (Moksnes et al., 2010).

Studies of SOC in the literature are based on a variety of samples, e.g., students with learning disabilities (Lackaye & Margalit, 2006), chronic diseases (Apers et al., 2013) or average populations (Moksnes et al., 2012, Rivera et al., 2012) and are associated with a wide range of different subjects such as perceived health (Honkinen et al., 2005), emotion awareness (Jellesma et al., 2006), academic performance (Oliva et al., 2019) to list a few. There are only a few studies, however, which investigate the development of SOC in youth with psychological and behavioral symptoms.

Antonovsky (1987) claimed that SOC develops during childhood and adolescence and stabilizes in early adulthood. However, this assumption has been challenged by many researchers producing inconclusive results. Jellesma et al. (2006) found no significant correlation between age and SOC, studying children from 8 to 13 years. Honkinen et al.'s (2008) study and Rivera et al.'s (2012) review concluded that sense of coherence did not show significant differences between 15- and 18-year-old adolescents. Kuuppelomaki & Utriainen (2003), Ying et al (2007) and Nilsson et al (2010) suggested that SOC increases while Feld et al (2003) and Nilsson et al (2003) found a declination with age. Individuals with a weak SOC can go through SOC deterioration (Antonovsky, 1987). Some authors suggested that SOC may improve during the entire life (Nilsson, et al, 2010). The literature is also ambiguous about differences in SOC between males and females. Some studies found that females have lower sense of coherence than males (Myrin & Lagerström, 2006; Koushede & Holstein, 2009; Nilsson et al., 2010), while others showed no difference between the sexes (Garcia-Moya et al., 2012). Kristensson & Ohlund (2005) explained that by the end of adolescence, males and females express distinct scores of SOC which represent different abilities to handle stressors. Emotional problems are found more commonly in females than in males increasingly around the end of adolescence (Bouma et al., 2008) which can affect sense of coherence as well. We have found no study which investigated sex differences among children under 14.

A relevant personal factor for the development of SOC is self-esteem (Lindström & Eriksson, 2006), one of the classical General Resistance Resources. Empirical studies showed that better self-esteem predicted higher SOC (Moksnes et al., 2016), less anxiety and depression (Cederblad et al., 2003) in youth. Self-esteem is a relatively stable but not immutable trait that increases from adolescence to adulthood predicting accomplishment and well-being in dimensions such as relationships, work and health (Orth & Robins, 2014). The relationship of SOC and self-esteem in childhood has not been studied extensively.

According to the literature, a sound SOC is positively associated with good mental health and negatively associated with anguish and stress (Grayson, 2007), anxiety, depression, (Blom et al, 2010), symptoms of hyperactivity and inattention (Edbom et al, 2010). Poor SOC may also be associated with a wide range of psychiatric disorders in childhood and adolescence. Behavioral problems and attention-deficit/hyper-activity disorder (ADHD) create difficult inter-actions and ruin social support that could help to cope with the environment. Edbom et al (2010) found that high sense of coherence at age 16 acted as a protective factor against symptoms of inattention and hyperactivity five years later in a sample of 156 twin pairs diagnosed with ADHD.

Empirical evidence endorses a relationship between SOC, health behavior and well-being in adolescence (Honkinen et al., 2005). Brawn-Lewensohn et al (2017) found that high scores of SOC were related to decrease in stress, and less internalization and externalization of problems in youth. Early psychopathological symptoms such as anxiety and depression during adolescence appear to predict lower sense of coherence (Blom et al., 2010). Based on the above findings, it is important to study which type of psychological problems have a strong negative effect on SOC development and thus function as risk factors for low resilience in adulthood.

To date, no studies were found comparing SOC in childhood to adolescence. Furthermore, there are a number of researches about the relationship between SOC and psychological symptoms in adolescents but children are not involved in these evaluations. The present study aims to investigate the association between sense of coherence, self-esteem and psychological problems in youth under psychiatric care. The following research questions were examined: What is the relationship between sense of coherence and psychological symptoms? What is the relationship between sense of coherence and self-esteem? Is there a difference between sense of coherence and self-esteem in gender and age in regard to psychological symptoms? Which psychological symptoms are the strongest predictors of sense of coherence?

SUBJECTS AND METHODS

This study used a quantitative method in a descriptive and associational cross-sectional design.

SUBJECTS

The sample consisted of clinical in- and outpatient children and adolescents of the Child Psychiatry Unit of Szeged University, Hungary. Patients and parents were given information about the study and agreed to participate by signing the consent form. Inclusion criteria were age at or above eleven years (being in 5th grade in school) and normal intelligence. The questionnaires were completed in a paper and pencil format. Prior to conducting the study, the approval of the Institutional Review Board (IRB) of the University of Szeged was obtained. Confidentiality and anonymity were carefully protected and ensured during all stages of the study. The study conformed to the provisions of the Declaration of Helsinki in 1995. The final sample was composed of 103 subjects (35 males and 68 females with a mean age of 14.56 years (SD: 1.91).) The age ranged from 11 to 18 years. 58 adolescents and 45 children participated.

INSTRUMENTS

Sense of Coherence Scale (SOCS-13)

The original form of SOCS consists of 29 items and was created by Antonovsky (1987). A shorter version (SOCS-13) was also developed to facilitate administration (Antonovsky, 1987) and is frequently used with children and adolescents. The response alternatives are on a semantic Likert scale from 1 to 7 points. Scores for SOCS-13 range between 13 and 91 points, higher scores indicate stronger SOC. Literature shows good reliability data for SOCS-13: internal consistency measured by Cronbach α ranges from 0.70 to 0.92 (Eriksson & Lindström, 2005), test-retest reliability scores range from 0.69 to 0.72 (Eriksson & Lindström, 2005). There have been two validation studies of the Hungarian versions of the SOCS previously, both on adult populations. The original form of SOCS-29 items was translated and validated by Jeges and Varga (2006). SOCS-13 items were studied by Balajti et al. (2006). The present study used the 13-item version for children and the 29-item version of SOCS for adolescents. To be able to compare adolescents to children in regard of sense of coherence, the 13 items of SOCS-13 were

extracted from SOCS-29. Internal consistency was excellent for both groups; Cronbach α was 0,87 for children and 0,89 for adolescents.

Rosenberg Self-Esteem Scale (RSE)

RSE was developed for adolescents as a self-report scale to assess positive and negative evaluations of self (Rosenberg, 1989). It contains 10 items rated on a 4-point Likert scale. The scores range from 0 to 30, higher scores show higher self-esteem. Original internal consistency ranged from 0.77 to 0.88, test-retest reliability from 0.82 to 0.85 (Rosenberg, 1989). Reliability in the present study was excellent; Cronbach α was 0.93 for children and 0.91 for adolescents. Rosenberg self-esteem scale was validated in Hungarian by Rózsa and Komlósi (Rózsa & Komlósi, 2014).

Strength and Difficulties Questionnaire (SDQ)

SDQ is a brief behavioral screening questionnaire used for children and adolescents 11 to 18 years old (Goodman, 2001) which consists of 25 items divided into five subscales measuring emotional symptoms, behavioral problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. Scores on the subscales range from 0 to 10. Total problem score is calculated by adding the four problem subscales; it ranges from 0-40 with lower scores meaning less problems. The original scale had acceptable internal consistency and 4 to 6 months test-retest reliability (Cronbach α: 0.73, 0.62, respectively) (Goodman, 2001). Reliability of SDQ in the present study was also in the acceptable range; Cronbach α for children was 0.72, Cronbach α for adolescents was 0.70. The Strength and Difficulties Questionnaire was validated in Hungarian by Turi, Gervai, Áspán et al. (2013).

All three questionnaires were completed by children/adolescents about themselves.

Statistical Analysis

Statistical analyses were performed using IBM Statistics SPSS, version 22. Descriptive statistics including frequencies, percentages, means and standard deviations were used. To examine possible differences between groups on baseline characteristics, independent t-test was used for continuous and Chi square test for categorical variables. Regression analyses were made separately for children and adolescents to measure factors predicting sense of coherence.

RESULTS

Demographic characteristics of the sample is shown in *Table 1*. There were significant differences between children and adolescents in the ages of the parents and sex ratio. The adolescent sample had more females.

Table 1. Demographic characteristics of the sample

Variables	All sample	Child	Adolescent	p
	Mean (SD)			
Age (years)	14.56 (1.91)	12.71 (0.92)	16.0 (1.04)	0.000
Mothers' age (years)	43.77 (5.34)	42.43 (5.13)	44.85 (5.31)	0.025
Fathers' age (years)	47.72 (7.44)	45.73 (7.91)	49.23 (6.76)	0.028
Mothers' education (years)	13.39 (3.49)	12.73 (3.33)	13.87 (3.56)	0.111
Fathers' education (years)	13.83 (3.38)	14.01 (3.37)	13.7 (3.41)	0.646
	N (%)			
Sex (female)	68 (66)	23 (51.1)	45 (77.6)	0.005
Living with biological mother	97 (97)	44 (97.8)	53 (91.4)	0.297
Living with biological father	74 (78.7)	28 (62.2)	46 (79.3)	0.082
Divorced parents	57 (55.3)	27 (60%)	30 (51.7)	0.423
Average income low	16 (16.5%)	6 (14%)	10 (18.5%)	0.726
middle	59 (60.8%)	28 (65%)	31 (57.4%)	
high	22 (22.7%)	9 (21%)	13 (24.1%)	

The mean scores and standard deviations of the questionnaires are shown in *Table 2*. Significant differences were found in SOCS-13, RSE and the Emotional subscale of SDQ between the two age groups.

Table 2. Means and standard deviations of questionnaires for children and adolescents

	SOCS13 mean/ SD	RSE mean/ SD	SDQ Total mean/ SD	SDQEm mean/ SD	SDQHyp mean/ SD	SDQCon mean/ SD	SDQ Peer mean/ SD
Children (N=45)	55.93/ 15.45	16.53/ 7.54	15.37/ 6.28	4.34/ 2.83	4.77/ 2.32	3.13/ 1.77	3.40/ 2.10
Adoles- cents (N=58)	48.95/ 15.22	13.55/ 6.30	16.19/ 6.28	5.88/ 2.87	4.41/ 2.23	2.71/ 1.73	3.19/ 1.79
p	0.024	0.039	0.519	0.008	0.434	0.224	0.604
Total (N=103)	52.00/ 15.63	14.86/ 6.99	15.84/ 6.26	5.22/ 2.94	4.57/ 2.27	2.89/ 1.75	3.28/ 1.97

SOCS13- Sense of Coherence Scale, RSE- Rosenberg Self-esteem Scale, SDQ-Total Strength and Difficulties Questionnaire total score, SDQEm- Strength and Difficulties Questionnaire Emotional subscale, SDQHyp- Strength and Difficulties Questionnaire Hyperactivity-inattention subscale, SDQCon- Strength and Difficulties Questionnaire Conduct problems subscale, SDQPeer- Strength and Difficulties Questionnaire Peer problems subscale, significant if p<0.05

There were no differences between males and females in the adolescent group in any of the analyzed variables. Males had higher self-esteem scores among children *(Table 3)*.

Table 3. Means and standard deviation for males and females (N=103)

	Children			Adolescents		
	SOCS-13	RSE	SDQTot	SOCS-13	RSE	SDQTot
Male (N=35)	59.2 (13.90)	19.6 (5.97)	14.8 (6.7)	46.8 (11.20)	12.4 (5.50)	11.2 (4.80)
Female (N=68)	52.8 (16.50)	16.5 (7.80)	15.9 (6.0)	49.6 (16.30)	13.9 (6.50)	16.3 (6.70)
p	0.169	0.005	0.573	0.562	0.497	0.449

SOCS13- Sense of Coherence Scale, RSE- Rosenberg Self-Esteem Scale, SDQTot- Strength and Difficulties Questionnaire total score, significant if p<0.05

Positive correlations were found between SOCS-13 and RSE for both children and adolescents (Pearson r=0.527, p<0.00 and Pearson r=0.684, p<0.00, respectively). Inverse correlations were found between SOCS-13 and SDQ Total scores for both children and adolescents (Pearson r= -0.625, p<0.00 and Pearson r=-0.848, p<0.00, respectively). All subscales of SDQ except conduct problems were negatively correlated with SOCS-13 in children (SOCS-13 and SDQEm Pearson r= -0.686, p<0.00, SOCS-13 and SDQHyp Pearson r=-0.362, p<0.02, SOCS-13 and SDQPeer Pearson r=-0.439, p<0.00). All subscales of SDQ were negatively correlated with SOCS-13 in adolescents (SOCS-13 and SDQEm Pearson r= -0.706, p<0.00, SOCS-13 and SDQCon Pearson r= -0.502, p<0.00, SOCS-13 and SDQHyp Pearson r= -0.683, p<0.00, SOCS-13 and SDQPeer Pearson r=-0.505, p<0.00). Correlations were stronger in adolescents.

Stepwise regression analysis was done separately for children and adolescents in order to determine the relationship between SOC and the other variables. SOC was used as the dependent variable and self-esteem, SDQ emotional, hyperactivity, conduct and peer relations subscales, age and sex were the independent variables *(Table 4)*. For child SOCS-13 as the dependent variable, the forward stepwise procedure added only one variable, emotional problems measured by the SDQ emotional subscale indicating that emotional problems were related to lower SOC in children. All other variables not included in the model failed to meet entry criteria. Emotional problems explained 47% of the variance of SOC. For adolescent SOCS-13 as the dependent variable, the forward stepwise procedure added 3 variables, self-esteem first, measured by RSE, hyperactivity/inattention problems second, measured by the SDQ hyperactivity subscale and emotional problems third, measured by the SDQ emotional problems subscale. The final model explained 72.5% of the variance of sense of coherence in adolescents. Sex and age did not have a significant effect in the model.

Table 4. Stepwise multiple regression analyses: Prediction of SOC in children and adolescents (N=103)

Step Predictor	r2 (after each step)	Beta	df	F
Children				
SDQ Emotional problems	0.47	-0.69	1, 39	34.52***
Adolescents				
RSE self-esteem	0.47	0.28	1, 53	46.53***
SDQ Hyperactivity/ Inattention	0.60	-0.41	1, 52	39.31***
SDQ Emotional problems	0.73	-0.42	1, 51	44.86***

SOC: Sense of coherence, SDQ: Strength and difficulties questionnaire, RSE: Rosenberg Self-Esteem Scale, ***p<0.001

DISCUSSION

The present study aimed to investigate and com-pare sense of coherence in children and adolescents examining sex and age differences and study factors predicting it. Self-esteem and psychological symptoms are both known to influence sense of coherence and adaptability to life stress and adequate coping. There are numerous studies about SOC in normal pop-ulations, mainly adolescents but much less in children with psychological symptoms. We in-tended to fill this gap by investigating children and adolescents under psychiatric care.

Low sense of coherence showed a strong rela-tionship to psychological problems in children and adolescents. The strongest negative corre-lation was found with emotional symptoms in both age groups. Moksnes et al (2010) also found an inverse correlation between SOC and depression/anxiety in an adolescent school sample. Problematic emotional states hamper adjusting to stressors related to puberty such as negative life events, peer problems, family and romantic relationships (Hampel & Peterman, 2006) and school context (Moksnes et al., 2010) which may lead to a feeling of inadequacy (Hampel & Peterman, 2006). Blom et al (2010) found such a strong relationship between SOC and emotional symptoms in adolescent females that they suggested SOC not to be an independent dimension but rather an inverse measure of persistent depression and anxiety. This suggestion is contradicted by our findings that hyperactivity and inattention symptoms, conduct problems and peer related difficulties were also related to lower SOC in adolescence. Furthermore, Blom's sample was limited to female adolescents. Edbom et al (2010) examined a 16-year-old community sample and found significant negative correlations between SOC and symptoms/diagnosis of attention deficit and hyperactivity. Their results are somewhat weaker than ours but this can be explained by the differences in the study populations (community vs psychiatric ill samples).

High self-esteem is characterized by self-confidence, positive self-evaluation and competence, medium self-esteem by oscillation between approval and rejection of self and low self-esteem by inadequacy and inability to face challenges (Scibigo et al., 2010). Researchers (e.g., Johnson, 2004; Pallant and Lae, 2002) considered self-esteem a relevant element contributor for SOC on adult populations. Moksnes and Lazarewicz (2016) studied the association between self-esteem and sense of coherence in Norwegian adolescents aged 13 to 18 years. A positive relationship was found between sense of coherence and self-esteem when controlling for age, sex, subjective health, and stress. Sex and age didn't have moderating effect on the association between sense of coherence and self-esteem. Primarily secure emotional attachment and active participation of children in the family decisions are essential for the development of a strong SOC (Sagy & Antonovsky, 2000). The value that parents give to the children's intentions and initiative may be internalized forming the structure of self-esteem (Johnson, 2004). The concepts of autonomy, self-assurance and the experience of basic trust are in accordance with many theories that explain self-esteem. Internal stress resulting from depression, anxiety and social withdrawal may negatively affect self-esteem and result in lower academic performance and lower SOC compromising social skills and future psychological adjustments (Honkinen et al., 2009).

We found that children had higher sense of coherence than adolescents. There are numerous studies based on adolescent samples (for a review, see Rivera et al, 2012), most of which found sense of coherence to be relatively stable during adolescence. Moksnes et al (2012) studied a school sample between the ages of 13 and 18 and found significantly higher SOC in younger adolescents. There are fewer studies in children and we found none comparing sense of coherence in children and adolescents. The difference between the two age groups can be explained on the one

hand by the transformation in components of self-definition such as interests, activities, and relationships that support self-esteem in childhood but not in adolescence (Pickhardt, 2013). Children learn and develop the ability to experience and communicate emotions and handle different feelings. SOC provides a singular and stable indicator of emotional adjustment during childhood; however, the passage to adolescence brings new opportunities but also challenges and difficulties (Idan et al., 2017). The lower sense of coherence in adolescents may be related to biological, emotional and social adjustments in which these individuals are going through (Buddeberg-Fischer et al., 2001). The difference in SOC between the age groups seems to be present with or without psychological disturbances. On the other hand, we found a strong relationship between emotional problems and SOC. Since depressive and anxious problems were more frequent in the adolescent group, this effect might also explain the difference in SOC even though emotional symptoms had the same effect on SOC in childhood as well.

No sex difference was found in SOC between females and males in the clinical sample. Other studies showed higher SOC in males than females (Moksnes et al., 2012, Myrin & Lagerstrom, 2006 and Honkinen et al., 2009). A review by Rivera et al (2012) summarized the impact of sex and age on sense of coherence. They concluded that in most studies there was no sex difference in children younger than 15 years while males had higher levels of SOC in adolescent samples above 15 years of age. Based on the average age of the present sample (14.56, SD 1.91 years) it included younger adolescents. Furthermore, the sex ratio was balanced among children but there were more females among adolescent's representative of the prevalence of psychological symptoms in this age group. Since emotional symptoms are known to influence sense of coherence, sample characteristics of the current study might explain the lack of sex differences in SOC.

Children had significantly higher self-esteem than adolescents in our sample. The high self-esteem in the youngest group can be explained as a result of unrealistic inflation in childhood. The declination in self-esteem would happen as a consequence of more realistic information about the self and the cognitive development during the transition to high school which produces more accurate evaluations of self-worth based on external feedback and social comparisons as well as more negative comments from parents, peers, and teachers. Age and sex differences of self-esteem are conflicting in the literature. Birkeland et al., (2012) reported an increase in self-esteem whereas Robins et al., (2002) accounted for a decrease in self-esteem during adolescence. According to the results of Moksnes, Espnes, and Lillefjell (2012), boys had higher self-esteem than girls. Affected by internal and external factors, self-esteem is a crucial component of the self-concept (Birkeland et al., (2012), a protective factor working as a buffer against adversities (Orth, Robins & Meier, 2009), and a potential GRR in adolescence when other factors are considered (Moksnes & Lazarewicz (2016). In summary, regardless of sex and age differences, self-esteem is a positive and sound resource for SOC (Moksnes & Lazarewicz, 2016).

Emotional problems were the only factors that predicted and explained sense of coherence in children. It seems that the negative effect of emotional problems develops early and might lead to poor SOC. Life seems meaningless, chaotic and unmanageable to individuals with emotional problems and they lack skills to identify useful resources and balance stressors adequately (Volanen et al, 2007). Hyperactivity and inattention predicted SOC during adolescence but not in childhood. When present at early ages these symptoms mostly cause problems to others around the child – to the parents and the teachers. If untreated or presenting with serious symptoms, the problems have long-term effects and increase the probability of psychiatric problems (Sourander & Helstela, 2005) and low

self-esteem in adolescence which are also related to a decrease in sense of coherence. At the same time, a strong sense of coherence might act as a protective factor for ADHD outcome in young adulthood (Edbom et al, 2010).

Individuals with a sound SOC will have the motivation to overcome stress and tension. Identifying the predictors of SOC is crucial to develop interventions focused to help youth at risk of psychological problems in childhood, adolescence and future adulthood (Honkinen et al., 2009). The accomplishment of a sound SOC relies upon the availability of General Resistance Resources such as adequate social support, self-esteem, education, wealth and childhood living conditions (Volanen et al., 2007) that help successful coping with life demands (Antonovsky, 1979, 1987). By offering children and adolescents adequate care for emotional and hyperactivity/inattention symptoms early on and helping them build a strong self-esteem, their resilience can be strengthened through a sound sense of coherence.

The study had some limitations. Since it is a cross-sectional study, causal relationships cannot be determined among the variables studied. Longitudinal studies are needed to establish the direction of the observed associations. Self-reported data were used in this study which might reflect subjective interpretation of psychological problems. However, emotional symptoms, self-esteem and sense of coherence are best described by the persons themselves and having one informant for all data increase reliability. The sample included a psychiatric youth population which resulted in limited generalizability of the results. However, it extended earlier findings on average school samples (e.g., Moksnes et al, 2012) and added important considerations to the study of sense of coherence development.

CONCLUSIONS

Emotional difficulties are the earliest and strongest predictors of sense of coherence among psychological problems. Inattention-hyperactivity and low self-esteem exert their negative effect during adolescence. Thus, the early identification of psychopathological factors and the presence of a sound sense of coherence are crucial for the protection of future psychological health. Literature proves that sense of coherence increases successful coping and resilience (Blom et al., 2010). High self-esteem, successful coping and balanced family context are some of the factors associated with supportive psychological health as well as the improvement of sense of coherence (Cederblad et al., 1994).

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A STUDY OF
THE DEATH OF URNAMMA

Geng Jinrui

Eötvös Loránd University, Doctoral School of History

ABSTRACT

The Death of Urnamma is a story written in Sumerian and is one of the most famous surviving works of Sumerian literature. The prevailing view is that it is a lamentation. This view is doubtful, because the so-called lamentation has no rhyme, nor does it use poetic language. In a way, this text can indeed be seen as a kind of historical codification, even though it comes from the hands of Babylonian intellectuals, who did use much historical information from previous generations. Because of this, the text not only preserves some of the real historical record, but also reflects the thinking of the elite, represented by its author, about life and the world. It is prudent to say that the text is a legendary hero's tale created by the elite of Old Babylon based on historical record, it belongs to the category of wisdom literature.

KEYWORDS:

- story
- lamentation
- sumerian literature
- urnamma
- Babylonia

1. INTRODUCTION

The Death of Urnamma is a Sumerian story that describes the abandonment of Urnamma, the founder of the third dynasty of Ur (ca. 2112-2004 BCE), by the gods when disaster struck Ur and he was forced to travel to the underworld. The road to the underworld is a desolate one, a path of no return. When he reached the underworld, he offered the gods many valuable gifts, which they accepted and made him a critical judge of the underworld. However, Urnamma and his loved ones, represented by his wife, were in agony, and he blamed fate for his injustice. The goddess Inanna, angered by Urnamma's death, went to see Enlil in the hope that her faithful servant would return, but in the end, there was nothing she could do. Probably to appease the disgruntled, the god honoured Urnamma's achievements and declared that his great name would live forever, and here the story recorded in the text comes to an end. It is an informative story, but the surviving versions are not exceptionally complete, and there are many questions to be answered.

There are at least eight literary works about Urnamma. On the ETCSL (http://etcsl.orinst.ox.ac.uk/), they are divided into Ur-Namma A-H. The version currently available is the one that survived in the Old Babylonian period (ca. 1900-1600 BCE). The vast majority of his literary works are found at Nippur, with some excavated at Ur, Babylon, Lagash, Sippar and Susa. Urnamma-A, *The Death of Urnamma*, has four versions on the ETCSL, mainly from Nippur and Susa, of which

the Nippur version survives in about 240 lines and has a complete plot. Because of the importance of this text, scholars took note of it early on. The first studies of it began in 1917. Scholars have done much to collate these original documents. The important ones are discussed here.

S. Langdon published the first modern collation of *The Death of Urnamma* in 1917, an edition based on fragment CBS 4560. G. Castellino continued the work of collating the text in the early 1950s, and in 1957 he published a collation in which he made use of the same documents as Langdon. (Castellino, 1957: 1-57). In 1967, S. N. Kramer provided a completely new edition in which, for the first time, he made use of Ni 4487 in the collection of the Istanbul Museum in terms of the use of the text. Kramer's version, which consists of 240 lines, is noteworthy for some reasons, including the fact that he considers the text to be poorly categorized, that he did not consider it to be a lamentation and that the original author of the text could have been an imaginative poet from a palace or temple. He then pointed out that the original author of the text could have been an imaginative poet from a palace or a temple, and that since the text involved the gods and the Sumerian religious understanding, he thought it might belong to the category of wisdom literature; furthermore, he pointed out that the document had a unique historical value and contained some historical information. (Kramer, 1967: 104-122). In the 1970s, C. Wilcke also did important work by re-calibrating and giving a new edition. In his subsequent work, he also drew on the unpublished work of several scholars of the time, including D. O. Edzard and

M. Civil. In 1991, Kramer's posthumous work was published. He used Wilcke's research to revise, complete, and translate lines 198-242 and used Civil's unpublished manuscript, which contains a review of the small fragments from Nippur's small fragment and a paraphrase of the Susa copy. In this version, Kramer explicitly mentions that it is a poem, but the poem's authorship remains elusive. (Kramer, 1991: 193-214). In terms of the

translation, Kramer has improved on his work of 1967, and in his 20-year study of the text, he has solved some of the difficulties and made the translation more fluent. Kramer's two articles are widely used by many scholars and are important references for this article. In 1999, Esther Flückiger-Hawker published her monograph *Urnamma of Ur in Sumerian Literary Tradition*, the most comprehensive and complete study of the literary works on Urnamma to date. Her research is divided into five main parts, with a selection of photographs of cuneiform documents at the back of the book. The first four sections provide a full background on Urnamma, including the historical context of the time, who Urnamma was, an introduction to Sumerian royal hymns, research progress, original documents, and the connection of the documents to Sumerian cultural traditions. The fifth part is a collation, transliteration and translation of the entire literature on Urnamma with annotations where necessary and a comparison of the differences between the different editions. (Esther Flückiger-Hawker, 1999). The most readily available edition is from the ETCSL, a collection of modern translations of some of the important Sumerian literary works included on the site, published in 2004, which was reprinted in 2010.

The above is mainly a collation and translation of the original texts by scholars who, in the process, have been largely uninvolved with the historical and literary value of the texts themselves. They hardly ever publish a single article on the subject of history and literature, and most of the time, like other literary works, *The Death of Urnamma* is simply used as a supplement to support their research. The following is a selection of the important ones.

In the study of how the Sumerians dealt with death, Kramer used this text as one of his main points of reference. He notes that the poem may belong to a historical codification, very similar to *The cursing of Agade*. (Kramer, 1960: 59-68). Dina Katz, a scholar of death and funeral rituals as reflected in extant Sumerian texts, has

undertaken a detailed survey of all surviving Sumerian texts on the subject of the underworld and death, examining Sumerian views on the underworld from a variety of linguistic, sociological and historical perspectives, with a particular focus on the word kur, 'netherworld'. A section is devoted to Urnamma, and Katz selected passages for key commentary, for example, she even explores whether Urnamma travelled the path of the underworld on a donkey. Katz noted that it is uncertain who the author of this text was, and that it could have been Urnamma's wife or son, with Urnamma's wife being the most likely, judging by the tone. (Katz, 2003). In 2005, Andrew C. Cohen completed Death Rituals, Ideology, and the Development of Early Mesopotamian Kingship, a book on early civilization that combines text and archaeology in the hope of exploring the early history of Mesopotamia. (Cohen, 2005).

In the first volume of *The Oxford History of Historical Writing*, a multi-volume work by some distinguished historians, published in 2011, the authors consider this text to be exceptional among all surviving Sumerian literature, and they treat it as a historical document. (Michalowski, 2011).

Throughout the above, the study of *The Death of Urnamma* is still an area that can be explored, as there are many translations of this literary work, and many scholars who are good at Sumerian are happy to give their own translations and interpretations of it in a variety of ways. In combing through the literature and major research works, I have found that there is still room for further development of the studies of previous scholars, such as the exploration of the elite view of life and death in early civilisations, and of the literature.[1]

2. LITERARY ANALYSIS OF THE TEXT

W. W. Hallo devoted his long academic career to studying Sumerian literature and is one of the foremost authorities in this field. He regarded the text as a poetic response to an absolute or imagined disaster. Further, he compared lamentations to the biblical tradition, dividing them into 'public' and 'personal' lamentations. Hallo further notes that the scribes were aware of the different genres, so they sometimes added labels to their works. On this basis, Hallo identified *The Death of Urnamma* as a touching lamentation, probably by the king's widow, which falls under the category of 'king's lamentation'. He noted, of course, that mourning for members of the royal family was not confined to literary works but also appeared in official archives. (Hallo, 2010: 299-305). Other scholars have made similar observations. Wilcke noted the connection between this text and the lamentation literature,[2] Flückiger-Hawker was inspired to elaborate further on the relationship between them. Although she acknowledged that there is no evidence for a liturgical lament predating the OB period, she pointed to surviving administrative texts from the Ur III period as evidence that such a ritual did exist, and that professional lamenters existed from early dynastic times (ca. 2500-2200 BCE). (Flückiger-Hawker, 1999: 85-91).

Kramer has briefly reconstructed the history of the development of the Sumerian lamentation. In response to the elegy, Kramer defined a work born out of the grief of the Sumerian and Akkadian poets over the repeated ravages of their lands, cities, and temples. According to the surviving texts, he traced the origins of the lamentation to the time of Urukagina in the 24th century BC, when archivists left an exhaustive list of temples and altars in the city Lagash destroyed at the hands

1 My master's thesis addresses the issues that have not been addressed in depth by scholars, see J. Geng, *An analysis of The Death of Urnamma*, (Master's Thesis, Northeast Normal University, Changchun, 2019). This thesis was done in Chinese and is the first translation of the text into Chinese. But after arriving in Hungary and studying under my PhD supervisor, I discovered that the research I had done in China was seriously flawed and that many of the conclusions were absurd. This article is therefore also a revision of the problems I had with my master's thesis.

2 Some of Wilcke's research is unpublished and not easy to find, and Flückiger-Hawker summarises his research, see Flückiger-Hawker, 1999: 85.

of the tyrant Lugalzeggesi. The lamentation must have been an important literary genre among the poets during the war-torn times of the Akkadians and the Gutians. By the time of the Ur III period, the glory of the dynasties and the reality of one triumph led the poets to turn to the greatness of the gods, inspiring them to write a significant number of heroic epics and mythological tales, and lamentations once fell into obscurity because people had no time to cry. Half a century later, the tragic circumstances of the dynasty's fall left poets in bitter grief; mourning became a literary theme, and foreigners invaded the Ur. In later years, the poets who had been well educated in the Ur and Nippur composed long, sorrowful poems at various rituals, mourning the misfortunes of the Sumerians, and at the end of their elegies, they looked forward to revival. However, the Sumerian era eventually ended, and the lamentation gradually became a ritual tradition in Mesopotamia until the Seleucid period. (Kramer, 1981: 270-271).

Based on the studies of several of the above scholars, it seems easy to draw the following conclusive conclusions:

A) *The Death of Urnamma* is a lamentation, it belongs to the category of wisdom literature.
B) All lamentations were created by a specific group of people, and that group is the poets.
C) The lamentations are sung by a specific group.

Unfortunately, if the conclusions of these scholars are re-examined with a sense of caution, their views are not supported by strong evidence. In the first place, much of Kramer's reconstruction is motivated by the imagination of modern literary scholars. There are no surviving texts that prove the existence of a community of poets in the Ur III period, and it is doubtful that there was even a so-called 'poet' of the period. It must be seriously noted that the vast majority of the so-called

'Sumerian literature' that exists comes from the OB period, a time when Sumerian was no longer spoken, and their authors were Babylonian intellectuals, all of whom spoke Akkadian as their mother tongue.[3] That is, the more likely scenario is that the Babylonian elite created this story (and other wonderful tales) based on the history handed down to them and the knowledge they possessed, primarily for the teaching of Sumerian writing skills aimed at higher intellectuals, and for the remembrance of ancient history. In the process of creating the story they could not have completely fabricated it, hence the phenomenon of parts of the story that Flückiger-Hawker pointed out as fitting the administrative file.

Secondly, the conclusion that this text belongs to a lamentation is also not reliable (including those works that have been identified as such by Assyriologists on the ETCSL). If a piece of literature needs to be sung, then it must use poetic language. As poems, their most basic characteristic is that they have rhyme. On the basis of an analysis of the text, it can be determined that it has no rhyme at all, and a work that has no rhyme at all cannot be called poetry.

Furthermore, although there are some 'repetitive sentences' in this text, for example[4]:

(6). /urim$_5$\ki-ma ḫul-ĝal2 im-ši-DU sipad zid ba-ra-ab-e3
(7). /sipad zid\ ur-d/namma\ /ba\-ra-ab-e3 sipad zid ba-ra-ab-e3
Misfortune has befallen Ur, and the faithful shepherd has passed away!
The faithful shepherd Urnamma has passed away! The faithful shepherd has passed away!

(146). lugal-ĝu10 i-si-iš ki-en-gi-ra-ke4 sa2 nam-ga-/mu\-ni-ib-dug4
(147). ur-dnamma i-si-iš ki-en-gi-ra-ke4 sa2 nam-ga-/mu\-ni-ib-dug4

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3 When Sumerian died out is a controversial topic, but with the exception of a very few scholars, most agree that it died out as a spoken language with the OB period or earlier. A discussion of this issue can be found in two important conference articles. See Michalowski, 2007: 163-190, and Woods, 2007:95-124.

4 All sentences are from the Nippur version in ETCSL, and the translations are by myself.

Sumer's cry of anguish reached my king.
Sumer's cry of anguish reached my king
Urnamma,

the presence of such sentences does not prove the presence of choral refrains in the text, but merely the author's repetition of a story at an important point in the narrative to reflect the importance of a particular storyline. This is because such sentences occur in a very haphazard and unstructured manner, without any regularity. While modern people certainly cannot accuse the author of spontaneity, they should equally not consider this to be a beautiful poetic language.

The real regularity exists in the repetition of paragraph structure, which manifests itself as:

A. Presents (as the object)
B. A god…ra (as the dative)
C. sipad ur-dnamma-ke4 e2-gal-a-na ĝiš im-ma-ab-tag-ge (the shepherd Urnamma offered gifts at his palace)

Cautiously, this phenomenon still does not suggest a poetic language, the reason for which is the rather monotonous structure of the story. In the story of the underworld, Urnamma had to offer gifts to the gods, and he had to pass through seven palaces. As he passed through each palace, the story is structured as 'Urnamma offered gifts to the gods', where the gods and gifts changed from palace to palace, but the author used a single narrative device to tell the story, which results in this apparent repetition. This is not deliberate on the part of the author but is a method he is required to use when driving the storyline.

As such, it is a text that no one sings, and its own composition does not conform to the general norms of poetry. Further, the classification of similar texts by Assyriologists as either elegiac or poetic is not supported by strong evidence when dealing with them. They do, however, fall under the category of wisdom literature, and these works, done by the Babylonian elite who mastered the ability to write in Sumerian, circulated in a very small circle; they were never widely disseminated in society. In short, it is a visceral story composed by Babylonian intellectuals, which does use many tips for writing, but is by no means a lamentation or a poem.

Readers may, of course, have a contrary conjecture that these stories were first circulated in society as heroic poetic histories, and then they were re-written by intellectuals. This situation is not impossible, as such traditions exist all over the world. But the issue under discussion here is this completed text, or rather all texts from the OB period composed in Sumerian, which had no possibility of re-entering the circulation of society, since no one other than the elite mastered Sumerian, much less heard them sung by a particular group.

In discussing the above, there is no denial of the existence of gala as a group. There are hundreds of evidence in early Mesopotamian documents to suggest that the gala existed as a profession, i.e. a mourner. However, the existence of this occupation is irrelevant to the question under discussion, since there is no evidence that the author of this text had any connection with the lamenters or mourners.

3. CAN THE DEATH OF URNAMMA BE SEEN AS A KIND OF HISTORICAL CODIFICATION?

It must be noted that although this text comes from a time when the Sumerian language was dead, some of its contents may indeed correspond to real history. It is not only the only literary work dealing with the funeral of King Ur, but it is also the only document that mentions the cause of Urnamma's death. In the story, most of the gods abandon Urnamma, only a very few still have sympathy for him, and the whole land is in chaos. This confusion is very close to the history in the archives. The first part of the reign of Shulgi, Urnamma's son, was focused on domestic, or religious, activities, and in particular on his links with Nippur, but there was

little foreign activity, and in the eighteenth year of his reign his daughter became a foreign queen. (Frayne, 1997: 100). His early efforts were focused on domestic matters while seeking to maintain peace with foreign countries. And it was only with the relative stability of the country that the king was able to forge greatness after his twenty-year reign. In those days, after all, the king's rule depended heavily on the military power at his disposal and on the support of the social elite. From the beginning to the end, the dynasty failed to achieve centralisation and the authority of the central government was relatively weak.[5]

Furthermore, it is possible that the author drew on the administrative archives of the Ur III period in creating the story of Urnamma's journey to the underworld, and Katz has made a detailed study of a text concerning the burial of a king whose tomb was owned by the fourth king of the Ur III. The whole ritual is a tedious one. The first ritual was the casting of a goat into the canal at midnight on the fifteenth day of a given month; the second was the offering of different kinds of goats to the gods and to the dead kings on that night; the third was the offering of tributes to some of the most important gods on the night of the sixteenth day, and the placing of a goat and a sheep in the canal, while the king's soul was still intact; the fourth ritual was held on the seventeenth day. The fourth ritual was held at midnight on the seventeenth day, when the king's soul was freed, and the ceremony was the grandest of all, with many gods and non-living beings considered sacred receiving tributes. These ceremonies took place at night, at what was considered to be the entrance to the underworld. The whole ceremony is known as the 'first three days of rituals', and at the end of it the tomb needs to be closed. On the sixth, ninth, twelfth and thirteenth days of the second month after

the burial of the corpse, the sacrifice was not too great, consisting of 10 bulls and 142 sheep. (Katz, 2007: 174-180). Compare *The Death of Urnamma*, where the author simplifies the funeral rites into an episode of the king offering tributes at different palaces. Here is further evidence that the author did not just make up the story as he went along, but that it is supported by the historical record.

However, when modern historians write about this period, they usually assume that Urnamma died in battle, and it is this story that is the source of their evidence. It seems a stretch to use a literary work directly as a historical record, since the only record of the cause of Urnamma's death is this story, which cannot exclude artistic manipulation by the author in the process of creation. Because Urnamma was an outstanding monarch, whose prestige spread around and was passed down to future generations, the author may well have used a tragic device to write about the hero's death in order to imbue the story with heroism and romance, and with greater educational significance for the elite who were able to read it. At the time of the Urnamma's various gifts, the gods were ranked in order, with the gods representing war clearly taking precedence over those representing writing, thus alluding to the greater power of the military nobility over the civil officials of the period. The Babylonians also admired force, and their country was built in battle after battle, and the celebration of a hero's death in battle is exactly what they craved for in war. For these reasons, it is likely that the author fabricated the cause of Urnamma's death in the story.

In short, *The Death of Urnamma* can therefore be regarded as a historical archive because it can be contrasted with what is recorded in the administrative archives, rather than because it can stand alone as evidence for historians writing history.

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5 Contrary to the assertions of traditional historians, in recent years scholars have demonstrated by ample evidence the weakness of the Ur III reign. For example, Michalowski tended to deny the absolute authority of the Ur royal family and their absolute control over the local areas. Even in the Shulgi era, the central government of the dynasty and the local nobles guarded against each other. On the one hand, the rulers of Ur would exaggerate the evils of the Akkadian kingdom to reinforce the legitimacy of Ur' s rule, while on the other hand they kept quiet about their internal discord and brutal political struggles. See Michalowski, 2013: 187-197.

4. DOES *THE DEATH OF URNAMMA* REFLECT THE PHILOSOPHY OF EARLY CIVILISATION?

In this story, one can indeed see how people of that era thought about life and death. It is important to emphasise that by 'people' we mean the Mesopotamian elite, or intellectuals. Any attempt to find the 'thoughts' of the masses in these niche texts, created by a few and circulated only by a few, would be futile. What's more, these intellectuals composed in Sumerian, a language which, as noted earlier, was no longer spoken in the OB period.

In the minds of the Babylonian elite, the underworld was a place of both equality and inequality. It was equal in that everyone had to come here after death and could never leave, whether they were good or evil, kings or beggars, or even gods; everyone had to be judged and adjudicated by the gods; although the quality of food and drink for the souls varied, it depended on the provisions of the world and the judgement of the underworld on the soul's behaviour in life, and no soul had the right to demand better treatment from the underworld under its power. No soul had the right to demand by its power that it be treated better. The inequality lies in the fact that the status of a soul in the underworld also depends on its status in life, and souls of special status, such as Urnamma, can bribe their way to a place of residence and a position an inquisitor that ordinary souls do not deserve. He achieved a better position because of his precious and abundant offerings, which brought a great deal of wealth to the underworld, and it seems that the underworld may have valued the number of possessions more than good or evil. The perception of the importance of wealth was not unique to the Babylonians but rather arose from the rise of the city, at a time when so-called kings or military leaders were able to pool together people, resources, and wealth, all of which gave them an advantage in city politics and foreign expansion.

Therefore, they do not seek the so-called afterlife, and there is no afterlife in Mesopotamia. The underworld was their final destination, perhaps because they could not obtain the justice they had hoped for in life and left such good intentions in the underworld, an eerie and frightening but still limited place of fairness and justice. If we consider the above, despite the many pessimistic accounts of the underworld, the Babylonian intellectuals had a great love for life on earth, they did not beg for immortality on earth, they did not place all their hopes in the gods, and the human soul could never reach the sky where the gods were, it could only go 'down'. The intellectuals in life cherished what they considered to be goodness, justice, and law, and opposed evil, disorder and injustice, even the king, one of whose most important tasks was to assure the nation that he had upheld justice. They lived their lives lovingly and valuing others, in fact, all for the sake of a satisfying life for themselves in that desolate place in the underworld. For it is only by obtaining a good quality of life in reality that one can successfully pass the judgement of the underworld, and if one does not want to take a little responsibility for bumbling around in the human world, then entering the underworld will only be more painful. For them, entering the underworld means that the soul has been given eternity, the underworld is a parallel concept to the earthly world, where the soul will be immortal and where anyone can reach the eternal place, but whether one suffers or is happy there depends to a large extent on whether one values and loves life on earth more. The fact that Urnamma, the king, dares to complain openly about the decisions of the gods and to denounce their injustice is partly an indication that the elite of Mesopotamia are bold enough to rebel against fate, as is the king in the story, whose beloved cause is not finished, who is fond of his family and who is responsible for his army, even if this challenge to fate is ultimately unsuccessful. Unfortunately, however, this perception of the elite may be one of the major factors that have

kept Mesopotamia in turmoil and never free from killing throughout its thousands of years of history.

5. CONCLUSION

 The discussion in this article denies the possibility of *The Death of Urnamma* as a lamentation and raises a new question about whether modern scholars are justified in their classification of ancient literature. This work aside, modern scholars have unmistakably labelled other literary works as lamentations when naming them. Notable among these are the following works: *The lament for Urim, The lament for Sumer and Urim, The lament for Nibru, The lament for Unug, and The lament for Eridug*. Scholars do not seem to have considered the possibility of these works being sung, nor have they noticed that all of them are more like telling a story than poetry. Moreover, the vast majority of the literature comes from a period when the Sumerian language had died out. However, this paper merely raises this question through the study of *The Death of Urnamma*, rather than resolving it, as other issues may be involved.

In telling the story, *The Death of Urnamma* preserves much of the historical information that can be reconciled with the administrative archives, reflecting the fact that literature does have a certain function in writing history, a function that literature everywhere has. However, modern historians cannot conclude that just because the works of the ancients had such a function, that literature can necessarily be used as definitive evidence; everything must be checked against the actual archival and archaeological evidence of recorded history. As the ancients created these works, they would express, either consciously or unconsciously, their reflections on the world and on life, and although all of them are fragmented and not philosophical in the modern sense, in the study of early civilisations they can help modern people to gain a deeper understanding of the period. The great pity is that, as the ancient people were overwhelmingly illiterate, all literature was produced by the elite. This problem is exacerbated by the fact that the texts from ancient Babylon were written in a language that was not their mother tongue, and in this way their greatest aim was to pass on the knowledge of a language that was already the exclusive preserve of the elite, as a mark of honour for their class. In those days, the use of Sumerian to record important texts was still an ancient tradition, and Sumerian made it possible to cover texts that only a few people could read with an aura of sanctity. In other words, the worldview underlying works like *The Death of Urnamma* can only represent the intellectuals of ancient Babylon, not the third dynasty of Ur as described in the story.

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QAJAR DYNASTY AND AMBIVALENT ATTEMPTS OF MODERNIZATION IN IRAN

Reihaneh Hosseini

Eötvös Loránd University, Doctoral School of Philosophy

ABSTRACT

In the late 1940s, Western modern was introduced to the Iranian art scene, and through its emergence, traditional art was overshadowed. In the mid-1960s, realizing that they are losing touch with their traditions and culture encouraged some artists to reinvigorate traditions by using traditional elements in their art. Female artists were significant actors to accent the traditions in their artworks. By studying the modernization history of Iran and focusing on five contemporary Iranian female artists, the author aims to comprehend and analyze the motivation of these contemporary Iranian artists and the effectiveness of Iranian female artists' role in incorporating traditional art into contemporary (modern) art.

Throughout history, each country has either benefited from or missed significant opportunities due to intercultural exchanges. Having access and dominance over most of the Eastern hemisphere's political and societal affairs since the 16th century, European countries culturally and politically influenced many societies through industrialization and their lean on scientific principles. During the Qajar dynasty (1789-1925), Iranian people of both higher and lower status experienced vicissitudes due to these Western influences and the "souvenirs" brought to the country by Naser al-Din Shah, the fourth Qajar king. Qajar kings, known for their surfaced-level understanding of political and social matters, welcomed these changes without acknowledging their future functionality. Introduction to European fashion to the conservative and traditional society of Iran was Naser al-Din Shah's method of modernizing Iran and advancing towards Western standards. Having their rights neglected and being considered the inferior gender during the Qajar era, women became Naser al-Din Shah's "modern" experimental tools and were regulated to submit to the European fashion guideline. With this narrative in mind, three questions are essential to answer: 1- In what ways did modernity affect Iranian culture in terms of traditional values and belief system?, 2- How was the process of these changes communicated and evaluated?, and 3- What were the features of women's clothing during the Qajar era, before and after Iranian-European relations? To answer these questions, the author uses the qualitative descriptive-analytical research method by studying historical and theoretical literary works and photos of the said era gathered from libraries in Tehran and other informative open resources.

KEYWORDS:

- QAJAR DYNASTY
- NASER AL-DIN SHAH
- IRANIAN FASHION
- WOMEN
- MODERNIZATION
- INTERCULTURAL EXCHANGES

INTRODUCTION

Fashion is a form of anthropological coded language that reveals some of man's conscious and subconscious decisions and priorities for survival in a public hemisphere. Contrary to common belief, the use of clothing has not always been a means to cover the body. According to Roland Barthes, "some of the main reasons for using clothing are protection, modesty and styling."[1] By analyzing fashion trends, one could learn about the needs and the social mindset of a certain community or society as a whole. Every piece of clothing worn by different individuals provides enough information about the person's social identity, such as wealth, religion, birthplace, and social status.[2] Fashion, "a popular or the latest style of clothing, hair, decoration, or behaviour"[3], is often regarded as a superficial and ephemeral[4] phenomenon that directs historians and philosophers to the question why it has always been subject to change. Alison Lurie believes that these apparel changes are the result of the vicissitudes of societal conditions of different eras and regions.[5] Fashion is also considered a symbol of modern civilization, and Ferdinand Tönnies firmly states that 'fashion', a term coined in Europe, is the outcome of weakened traditional customs in the modern Western world.[6]

A country with a long-lasting civilizational background and home to multitude of traditions and cultures, Iran experienced notable cultural and societal changes with the emergence of the Qajar dynasty from the late 18th century to the mid-20th century. By strengthening its social and political affairs with Europe, the Qajar Dynasty acquainted the traditional people of Iran with the modern Western culture. Naser al-Din Shah, the fourth Qajar king, known for his modernization attempts, "undertook three well-publicized tours to Europe in 1873, 1878, and 1889 where, apart from official receptions, military and naval reviews, and visits to factories and performances at the theatre and opera, hospitality in the town and country homes of the aristocracy, provided essential support to diplomatic negotiations."[7] These trips not only provided him with basic information on European modern economic and ruling system, it also introduced him to a phenomenon known as 'fashion'.

A traditional society with conservative and patriarchal ruling kings, Iranian women of the Qajar Dynasty were barred from their basic human and religious rights. They were not permitted to decide on their appearance and had to submit to the obliged dress-code.[8] Immersed with the elegance of European garments and theatrical ballerina costumes, Naser al-Din Shah reinforced his idea of 'modern fashion' on the court ladies, and by introducing the Western dress-code to his people, the King naively believed in the progression of modernity in the Iranian society.[9] Despite Naser al-Din Shah's significant and active influence on the 'modernization' of Iranian women's apparels, it is pivotal to mention the involvement of other actors in the initiation of European fashion in the royal court, such as the European tourists and diplomats, and the members of the royal family, including the King's mother and daughter.

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2 Kiapour, M. Hadi, Yamaguchi, Kota, Berg, Alexander C., and Berg, Tamara L., "Hipster Wars: Discovering Elements of Fashion Styles", *Computer Vision – ECCV, Lecture Notes in Computer Science*, Vol.8689, no.1, 2014

3 The Oxford Dictionary

4 Meinhold, Roman, *Fashion Myths (A Cultural Critique, translated by John Irons)*, Bielefeld: Transcript Verlag, 2014

5 Lurie, Alison, *The Language of Clothes*, New York: Vintage Books, 1983

6 Tönnies, Ferdinand, Custom: *An Essay on Social Codes*, Translated by A. F. Borenstein, New York: Free Press, 1961

7 Scarce, Jennifer, "Entertainments East and West: Three Encounters between Iranians and Europeans during the Qajar Period (1786-1925)", *Iranian Studies*, Vol.40, no.4, September 2007

8 Ghoveimi, Fakhri, *The Record of Famous Iranian Women*, Tehran: Ministry of Education, 1973

9 Javadi Yeganeh, Mohammadreza, and Kashfi, Seyed Ali, "Signs System in Coverage", *Quarterly Journal of Women's Strategic Studies*, Vol.10, no.38, Winter 2008

THE QAJAR KINGS: EUROPEAN POWERS' PAWNS OF THE CHESS

After the repugnant defeat of the Afsharid dynasty in 1794, the Qajars, originally a Turkic tribe, ruled over Iran until 1925, and the country experienced eventful changes during this period. In hopes to revitalize the grand image Iran possessed during the Safavid empire of the 17th century, Aghaa Mohammad Khan Qajar, the founder of the Qajar dynasty, took on gruesome wars with the Afsharids and brought the country under his rule in 1795. It is believed that Aghaa Mohammad Khan's act of brutality was to avenge his early castration by the Afsharid dynasty's king and Nader Shah Afshar's successor, Adel Shah, which ultimately led to the Qajars' triumph over the Afsharids.[10]

The Iranian-European relations strengthened under Qajar kings' rule, however in the late 18th and 19th centuries, Iran's foreign affairs became highly affected by military conflicts with its neighboring countries and European powers, such as Britain, France, and Russia. Russia, after the consolidation of the reign of Catherine the Great, sought to implement Peter the Great's will to gain access to open waters. This approach resulted in taking a military approach towards Iran, which resulted in two periods of the Iran-Russia wars.[11] Similarly to a pawn of the chess, Iran was continually maltreated by the three great powers of the time, Britain, France, and Russia, and through their cumulative intrusion into Iran's political and commercial affairs, Qajar era's practiced traditions and culture became immensely influenced by foreign advances. Despite their religious claims, Qajar people practiced a superficial concept of Islam's Shiism which had its root grown from Western cultural and religious influences, and the superstitious religious sects who practiced rituals prohibited in Islam, such as idolizing people or paying the Sheikhs money or treasured items to enter the Heaven. The weakened faith in Qajar people created many discords in the Qajar-Iranian families and society as a whole.[12]

His castration eliminated the possibility for Aghaa Mohammad Khan to have a child of his own, hence Fath-Ali Shah, his nephew, became the second Qajar king. Despite his efforts to revivify the Iranian Golden eras, such as the pre-Islamic Achaemenid and Sassanid empires and the Islamic Safavid and Zand dynasties, the Iranian political scene during Fath-Ali Shah's reign was majorly affected by the rivalry of Russia, Britain, and France in the early 1800s.[13] The rivalries of the three political powers resulted in minor political reforms in Iran, such as the short-lived strengthened military affairs.[14]

With Fath Ali Shah's demise, Mohammad Shah, the third Qajar king, took the throne and appointed Ghaem Magham Farahani as his Prime Minister. Ghaem Magham tactfully replaced the claimants to the throne and made notable social, educational, and cultural reforms, including the use of foreign languages in the court and education on European civilizations in schools and institutions.[15] After Mohammad Shah's passing and through Amir Kabir's support, crown prince Naser al-Din Mirza ascended the throne as the fourth Qajar king. Naser al-Din Mirza appointed Amir Kabir as his Prime Minister, who continued the path of Ghaem Magham's modernist reforms with more dynamism and detailed structural planning. Unfortunately, due to Naser al-Din

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10 Malcolm, S. John, *History of Persia: Volume II*, London: John Murray, 1815

11 Atkin, Muriel, *Russia and Iran: 1780-1828*, Minneapolis: University of Minnesota Press, 1980

12 Razavi, Seyyed Abbas, "Confrontation of Religious Scholars with Deviant Sects in the Qajar Period", *Hozeh Journal*, no.107-108, November 2001-February 2002

13 Rasouli Pour, Morteza, "Britain, Sold Iran to the Russians", *Yade Ayyam Journal*, no.41, October 2008

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Shah's mother, Malek Jahan Khanom, also known as Mahd-e-Olya[16], and the British manipulation, the reforms proposed by Amir Kabir did not reach the desired result. With Amir Kabir by Naser al-Din Shah's side, Britain was unsuccessful to expand its control over Iran, and being aware of Amir Kabir's influence on her son's decisions, Mahd-e-Olya became powerless to decide on the country's political affairs. Despite her efforts to gain his trust, Amir Kabir knew Mahd-e-Olya's true intentions and warned the King about his mother's injurious thoughts. To repent the experienced negligence, Mahd-e-Olya allied with the British government to descend Amir Kabir from his position.[17] By tarnishing his reputation and portraying him as a highbinder, Naser al-Din Shah's perspective of Amir Kabir was stained, and despite his respect for the Prime Minister, he ordered his exile and later, his execution. After his death, Amir Kabir's modernist mentality was carried on by the King, as Naser al-Din Shah became determined to follow his legacy.[18]

NASER AL-DIN SHAH; THE PROMOTING TOOL OF EUROPEAN CULTURAL AND ARTISTIC INFLUENCES

Naser al-Din Shah was born on July 16, 1831, in Kohanmir, Tabriz. He was the son of Mohammad Shah and Mahd-e-Olya, and with 50 years of ruling, he had the longest reign among the Qajar kings. He is also the first king in Iran known to have written his memoirs[19], which later gave historians the advantage of learning about his psychological, behavioral, cultural, philosophical, and social characteristics, as well as his ruling method. Little is known about his relationship with his father, but Mohammad Shah's suspicions about the birthright of Naser al-Din were the reason Naser al-Din became a defamed crown prince, and for five consecutive years of his childhood, Mohammad Shah disregarded him as his son.[20] The callous relationship between him and his father, as well as his parental disputes resulted in Naser al-Din Mirza tough upbringing. Despite the troubles he went through, his mother's support never left his side. Mahd-e-Olya was a literate woman, who was known for her elaborate use of foreign languages and became well acquainted with European civilizations. Through the presence of European women at the court, contact with European resident ambassadors and their wives, and meetings with European tourists, Mahd-e-Olya became educated in foreign relations and affairs. Due to her fond interest in the European culture, she asked Eugene Bore, a French teacher at the Bore school, to teach French to her son,

Figure 1. Nadar, Naser al-Din Shah Qajar, close up, with slight smile, circa 1885, 14.5 x 10.5 cm, Gallica Digital Library

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16 Mahd-e-Olya was a nickname in Iran that was mainly given to the grandmothers or the kings.
17 Admit, Fereydoon, *Amir Kabir and Iran*, Tehran: Kharazmi Publication, 1983
18 Cleveland, William L., *A History of the Modern Middle East*, Colorado: Westview Press, 2013
19 Naser al-Din Shah, *Naser al-Din Shah's Travelogue*, Tehran: Heydari Publication, 1983
20 Rohani, Raheleh, Amini, Ali Akbar, and Khosravi, Malek Taj, "The Effect of Naser al-Din Shah's Personality Traits on the Underdevelopment of Iran", *Strategic Policy Research Journal*, Vol.8, no.28, Spring 2019
21 ibid

and it is assumed that this ignited a spark in Naser al-Din Shah's interest in Europe[21], which is contrary to the interests of the previous kings, who appreciated the livelihood of the ancient Iranian emperors and their ruling method and sovereign attributes.

Following the culture of the Qajar tribe, Naser al-Din Shah is believed to have had above 112 wives and concubines. The fourth Qajar king is known for his yearn for women and the desire to outnumber his ancestor's, Fath-Ali Shah's[22] wives. A suggested study behind the many wives and concubines of Naser al-Din Shah is the lack of compassion he experienced as a child and sought for benevolence through his several marriages.[23]

His paternal dispute and the rigid competition of his uncles for the throne, brought the King closer to Mirza Taghi Khan Farahani. Mirza Taghi Khan, also known as Amir Kabir, later became the King's Prime Minister in 1848 and was considered a mentor and a father figure to Naser al-Din Mirza. He introduced Naser al-Din Shah to the spirit of reforms and modernization.[24] With his intelligence, he provided the means for Naser al-Din to ascend the throne and removed the obstacles preventing the crown prince to become king. Amir Kabir first put an end to the revolts of the internal rebellions and established order and security across the country. With his knowledge of foreign affairs and diplomacy, he then implemented a program to compensate for Iran's lack of educational, financial, and political advancements to reforms and urge Iran towards progression.[25] With the aim and priority to modernize and improve the country, Amir Kabir proposed to make a number of changes in the Iranian social hemisphere.[26]

However, after the murder of Amir Kabir on the King's order, the process of governance and cultural reform in Iran ceased, and the reign of Naser al-Din Shah lost its glory. Due to his lack of knowledge and full comprehension of the phenomenon, the King could never achieve Amir Kabir's determination for modernization. Naser al-Din Shah's nonchalant nature became the cause of political turmoil in the court[27], and with the mounted instability in its political and financial affairs, Iran lost parts of its land and resources. With all the mayhem ensuing during his reign, Naser al-Din Shah became determined to experience his first European journey on April 20, 1873, and due to his fascination with the European culture, this event recurred in 1878 and 1889, respectively.[28] Naser al-Din Shah is the first recorded Iranian king known to have visited Europe and to officially put down his memories[29] and experiences.

After each of his European trips, Naser al-Din Shah introduced and applied new technologies and changes in Iran, specifically in the capital city, Tehran. A number of the well-known achievements of this period are railway constructions, the launch of the first train from Tehran to Rey, and the establishment of mints, post offices, and telegraph offices. Another valuable equipment

22 Taraghi, Lotf-o-Allah, La'l, Hossein, *Jeyran and the Secrets of Naser-al-Din Shah's Harem*, Tehran: Par Publication, 2016
23 Rohani, Raheleh, Amini, Ali Akbar, and Khosravi, Malek Taj, "The Effect of Naser al-Din Shah's Personality Traits on the Underdevelopment of Iran", *Strategic Policy Research Journal*, Vol.8, no.28, Spring 2019
24 Fayyaz, Ebrahim, "Amir Kabir; Modernity and Modernism", *Mehr News Agency Database*, January 9, 2018
    http://noo.rs/l8dhs
25 Amanat, Abbas, "Pivot of the Universe: Nasir al-Din Shah Qajar and the Iranian Monarchy, 1831-1896", *Iranian Studies Journal*, Vol.32, no.3, Summer 1999
26 Adamiat, Fereydoon, *Amir Kabir and Iran*, Tehran: Kharazmi Publication, 1983
27 Polak, Jakob Eduard, *Polak's Travelogue: Iran and Iranians*, Tehran: Kharazmi Publication, 1989
28 Scarce, Jennifer, "Entertainments East and West: Three Encounters between Iranians and Europeans during the Qajar Period (1786-1925)", *Iranian Studies*, Vol.40, no.4, September 2007
29 Naser al-Din Shah, *Naser al-Din Shah's Travelogue*, Tehran: Heydari Publication, 1983

the King introduced was a lead printing machine with Persian and Latin typewriters.[30] One of the most significant changes witnessed in this period was the cabinet and military affairs' reformations, with the aim to reach European standards. Contrary to Amir Kabir, Naser al-Din Shah's understanding of modernity was surface-leveled. By introducing new technologies to the country, Naser al-Din Shah assumed he was following the same advanced path as European countries. However, to modernize a country, the society's mindset would have had to be changed and people would have needed to get educated; an issue completely neglected by the King.[31]

An imposing image engraved in Naser al-Din Shah's mind about his European trips was women's appearances and garbs. David Motadel writes: "He had found himself enraptured by the ballerina skirts when attending ballet performances in the European capitals, particularly in Berlin and St. Petersburg, and kept their style in mind when he returned to Tehran."[32] He was fascinated by how European ladies often displayed their bare shoulders and naked arms, or even their necklines and bosoms[33], but it was the ballerina costumes that left the most impression on him. With little understanding of how culture is the main cultivating tool of creating one's appearance and apparel, he perceived European attires 'fashionable', and aimed to apply his shallow understanding of modern fashion on the court ladies' traditional garments.

THE NASSERITE REGIME AND ITS ATTEMPTS ON IRANIAN FASHION'S MODERNIZATION

The Industrialization era (1760-1840) in Europe introduced people to the concept of modernity that was strongly tied to individuality.[34] Women's status in modern societies changed during the Industrialization, and they began recognizing their legal rights. This perceptual change resulted in women's liberation movements in Western societies, such as the Suffragette movement of 1903. Significant changes took place as industrialization created new opportunities for women's employment, which redefined their role in their homes and society. Women who previously lived under constant inequality, gained more independence and their newfound comfort became evident in how they dressed, which implied their new working and living conditions.[35]

The nature of modernity in Iran be perceived from two different angles. Dr. Najafi believes: "The first wave of indigenous and national modernization in the Qajar period, considering the cultural history of Iran in more than three centuries, is significant and the second wave is the transformation of traditional values and habits into modern practices, through the emergence of Westerners to Islamic countries, such as Iran."[36] The second wave was performed in two stages. "The first stage is based on a war-torn society in need of military technology after the war with Russia, and the next stage is the Western transformation of this society which later led to its moral destruction."[37]

30 Scarce, Jennifer, "Entertainments East and West: Three Encounters between Iranians and Europeans during the Qajar Period (1786-1925)", *Iranian Studies*, Vol.40, no.4, September 2007

31 Rohani, Raheleh, Amini, Ali Akbar, and Khosravi, Malek Taj, "The Effect of Naser al-Din Shah's Personality Traits on the Underdevelopment of Iran", *Strategic Policy Research Journal*, Vol.8, no.28, Spring 2019

32 Motadel, David, "The German Other: Nasir al-Din Shah's Perceptions of Difference and Gender during his Visits to Germany, 1873–89", *Iranian Studies Journal*, Vol.44, no.4, July 2011

33 ibid

34 Nowzari, Hossein Ali, *Formulation of Modernity and Postmodernity*, Tehran: Naghshe Jahan, 2009

35 Durant, Will, and Durant, Ariel, *The Story of Civilization: Volume 1*, New York: Simon & Schuster, 1963

36 Najafi, Moosa, *Falsafeye Tajaddod Dar Iran [Philosophy of Modernity in Iran]*, Tehran: Beinolmelal Publication, 2012

37 ibid

By moral destruction, Najafi suggests how modern practices affected people's religious beliefs, especially those in the court. Naser al-Din Shah, despite identifying himself as the King of Shiism[38], was affected by European ideologies and tried to advocate his understanding of modern values, which later stained his religious principles.

As mentioned previously, Naser al-Din Shah was not fully educated on the notion of modernity and only managed to scratch the surface by introducing its basic matters to people. Upon its arrival in Iran, modernity manifested itself in different areas, including in the royal court ladies' garments. During the modernization of the Qajar period, clothing as a cultural element, found a new form.[39] Women's clothing during the reign of previous kings followed the same styling pattern of the previous dynasties, specifically the Zands and Safavids. People of lower social and economic classes rarely witnessed any changes in their attires and dressed modestly. However, those of higher social status owned handmade and expensive wardrobe and their often heavily accessorized and lavish clothing became a source of fascination for the foreigners. Upon her arrival to the palace, Lady Ouseley, wife of the British ambassador, was accompanied by Fath-Ali Shah's wife. Lady Ouseley and Fath-Ali Shah's wife were both fascinated by each other's appearances. While Lady Ouseley was dressed austerely, Fath-Ali Shah's wife wore a heavily bejeweled headdress that made walking difficult for her.[40]

Before Naser al-Din Shah's reign and trips to Europe, court ladies wore transparent dresses, accessorized with pearls and jewels. These dresses had two slits in the front, which exposed their skin, something that was quite controversial to foreign visitors. The dresses were worn with pants or puffy skirts, made with large floral-

Figure 2. Unknown, Girl with Mirror, late 18th century, oil on canvas, 122cm x 84cm, Tbilisi: Art Museum of Georgia

Figure 3. Unknown, A Court Lady Playing a Santour, circa 1840, oil on canvas, 148x75.5cm, private collection

38 Khosronejad, Pedram, *Qajar Shiite Material Culture: From the Court of Naser Al-Din Shah to Popular Religious Paintings*, Oklahoma: Iranian and Persian Gulf Studies Program, 2018

39 Javadi Yeganeh, Mohammadreza, and Kashfi, Seyed Ali, "Signs System in Coverage", *Quarterly Journal of Women's Strategic Studies*, Vol.10, no.38, Winter 2008

40 Morier, James Justinian, *A Journey through Persia, Armenia, and Asia Minor, to Constantinople, in the years 1808 and 1809*, Boston: Adamant Media Corporation, 2004

patterned fabrics. Some of the court ladies wore embroidered cotton or velvet skirts, where the bottoms were decorated with golden ribbons, or pearls.[41] Due to their indoor activities, some of the ladies wore tight pants under their skirts to ease their movements. They also wore tight-fitting short or long-sleeved jackets ending in pointed cuffs. The cuffs were styled in a way that the ruffled sleeves from underneath were exposed. To accessorize it further, they included a heavily bejeweled belt with a geometric or Botteh-designed[42] loop.[43] To complete the look, the ladies often wore long transparent veils with festooned headdresses.

Until the first half of Naser al-Din Shah's reign, women dressed similarly to the past, but after his trip to Europe, women's raiment changed. Their indoor apparel became more modest accessory-wise, but more revealing after the King's return. Their outdoor appearance on the other hand, remained almost the same. In 1866, Jakob Eduard

Figure 4. Lutf'Ali Suratgar S., Untitled, circa 1893, ng, Flickr

Polak wrote: "Whenever they were required to leave the house and appear in public, they would wear puffy pleated pants underneath their dress, along with a black Chador, a long black head/body covering. In order to conceal their identity and visuals, they would wear a niqab[44] on their faces."[45]

After his visits to the ballet performances in Berlin and St. Petersburg, Naser al-Din Shah required his wives to wear the ballerina tutu skirts with white tights. In a relatively short period, these two clothing particles became prevalent in the royal court. Another piece worn by the court ladies that looked eerily similar to Western clothing was the Arkhalogh.[46] In his book Old Tehran, Hasan Beigi writes: "After Naser al-Din Shah's trip to Europe, due to his interest in the tights and short skirts of the St. Petersburg ballerina dancers, he ordered his court women to tighten their undergarments when he returned to Iran. Some women wore socks with the short skirts, which revealed their bare legs. After a while, the extremism of his order reached a point that not only the women of the court, but other women of higher social status followed the fashion of the King's wives and reduced the length of their undergarments. This situation continued until the King's desires subsided, which resulted the women to use coats and puffed long skirts, and it remained that way for a very long time."[47]

Madam Karla Serena, an Italian travel writer who lived in Iran among the court ladies until Naser al-Din Shah's second return from Europe, writes about how women dressed in the palace: "Women's make-up is usually thicker than usual, and their clothing is lighter and less modest."[48]

41 Drouville, Gaspard, Voyage to Iran, Translated by Manoochehr Etemadmoghadam, Tehran: Shab Aviz, 1988
42 Botteh is a traditional motif used in most of Iranian artifacts. It resembles a swayed cedar tree which symbolizes humility.
43 Drouville, Gaspard, Voyage to Iran, Translated by Manoochehr Etemadmoghadam, Tehran: Shab Aviz, 1988
44 Niqab is a veil worn by some women Muslim countries, that covers the face, apart from the eyes.
45 Polak, Jakob Eduard, Polak's Travelogue: Iran and Iranians, Tehran: Kharazmi Publication, 1989
46 Arkhalogh is a variation of today's coats.
47 Beigi, Hassan, Old Tehran, Tehran: Ghoghnoos, 2009
48   Serena, Karla, Madam Karla Serena's Travelogue, Tehran: Zavar Publishing, 1974

Figure 5. Alireza Majidi, Standing Girl, circa 1865, photograph, ng, private collection

Figure 6. Naser al-Din Shah, Naser al-Din Shah and Wives, 1867, photograph, ng, Library of University of Tehran

In her travelogue, she calls the new short skirts women wore Shaliteh: "Inside homes, women's clothing usually consists of short Shaliteh worn below the waist. The shorter the Shaliteh, the more acceptable and beautiful. It is essential to point out that the skirts of women who are not from the royal or noble families are longer than those of upper-class women. They wore simple satin or cotton headcovers and tied it in the front with a small decorative pin."[49]

Figure 7. Naser al-Din Shah, Untitled, 1867, photograph, ng, Library of University of Tehran

Madam Karla Serena believed the reason for the change in Iranian women's clothing was not Naser al-Din Shah, but his mother: "From what I have heard, the main reason short skirts became a common thing in the palace is due to her (Mahd-e-Olya) interest in the foreign ballerina skirts. Her interest in the ballerina tutus made her change the way her brides wore make-up and dressed. Due to this, court women wore short skirts which were even shorter than the original models."[50] It is important to mention that despite the changes observed in their attire, court ladies' makeup remained unchanged. From Madam Karla Serena's perspective, one can state that aside from Naser al-Din Shah's influence on the court ladies' attires, there were others who took part in Westernizing Iranian women's appearance.

Apart from Mahd-e-Olya, Naser al-Din Shah's daughter, Taj al-Saltaneh, was another great influence on Westernizing, or 'modernizing' Iranian women's fashion. Considered a rebel and feminist today, Taj al-Saltaneh wrote her memoirs from the age of 8 to 29 and gave detailed descriptions on her way of life and thinking. She impacted women's mentality by evoking the matter of equality: "Man was created free and independent. Why should man, who was created for freedom and a good life, be forced to live according to the wishes of others and be condemned to live according to

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49 ibid
50 ibid

*Figure 7. Naser al-Din Shah, Untitled, 1867, photograph,
ng, Library of University of Tehran*

CONCLUSION

The traditional and conservative Qajar Iran, experienced notable changes from the late 18th century. With constant defeats against European powers, Iran lost a vast number of resources and lands. During Naser al-Din Shah's reign, despite the social and security turmoil, Iran witnessed significant advancements with the help of Amir Kabir, the King's reformist Prime Minister. He transferred his modernist beliefs to Naser al-Din Shah in hopes for a better Iran, but his efforts were demolished due to Naser al-Din Shah's shallow understanding of modernity. The King's comprehension of modernity was unlike his Prime Minister's, as he failed to organize a detailed plan to turn traditional Iran into a modern society. Naser al-Din Shah made visits to Europe in 1873, 1878, and 1889, and upon his visits, he noticed how the European women dressed. He later introduced his court wives and concubines to his understanding of 'fashionable' garments, which were the European garments and theatrical ballerina dresses. Clothing became more revealing, and short skirts and white tights inspired by Western ballerinas along with fitted Arkhaloghs took over court ladies' attires. Mahd-e-Olya and Taj al-Saltaneh, Naser al-Din Shah's mother and daughter, respectively, were also important actors in Westernizing, or in their belief, 'modernizing' Iranian court ladies' garments. They admired Western culture and due to their lack of knowledge regarding modernity, Naser al-Din Shah and his family were not successful in changing Iranian women's dressing permanently. Despite their efforts, court ladies' firm religious beliefs impeded the completion of Iranian fashion transformation into European, and in the coming years, their outfits became longer and looser.

another's commands? In the species of man there is no differentiation. Human beings should live under one liberty and natural freedom."[51] With this mindset, she used her knowledge in European studies and became an advocate for women's rights. She tried to shed light on how conservatism was an act of regression and began acting and dressing similarly to the Europeans. After years of practicing European fashion, the fever of using this type of 'fashion', according to the royal family, subsided among the courtiers. Gradually the clothes became longer and looser. This event commenced from Naser al-Din Shah's wives and their discomfort with the new 'accepted' dressing. Still considered a religious society, it was distressing for women to put their religious beliefs aside and dress against them. Thus, Chador Namaz[52] replaced the Shalitehs and women began wearing headscarves in the garden and inside the palace.

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51 Taj al-Saltaneh, *Memoirs,* Tehran: Iranian History Publishers, 1999
52 Chador Namaz was a bouffant long skirt that covered the legs

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RITUAL, DEATH, AND ENVIRONMENT IN PERSIAN PASSION THEATRE

Zahra Fuladvand

Hungarian University of Fine Arts, Doctoral School

ABSTRACT

Looking deep through the history of theatre, we will see, many ritual performative events such as celebrations, religious rites, and annual festivals were held in outdoor 'found-environment' – in the streets, in private houses, or in taverns. What is now called environmental theatre was once part of a long tradition that had its roots in the European medieval theatre and numerous examples of non-western, eastern theatres such as **Persian passion theatre**.

Study on this non-theatrical environment and its connection with **ritual and death** ceremony in Persian Passion theatre is the main direction of this research paper.

In this study, all the second hand data and information about the research keywords is gathered and analyzed in the main body of discussion to answer these questions:

What are the origins of Persian Passion Theatre (Taaziyeh)? Is it coming from a funeral ceremony? What are the origins of space for this kind of ritual ceremony? Do these events have anything to do with rituals? What is the role of the environment in Persian Passion Theatre? Is there any cultural and social relationship between the space and people who are watching Taaziyeh every year?

Taaziyeh for the Iranian audience is part of ritual mourning with the audience standing in a circle of exchanging dynamic energy with the performance. The effects of the environment, eg. to build up the cultural and social relationship between the performance and the audience in this ritual performance, is discussed in the main body of this paper.

The case study for this research is Taaziyeh. This ritual traditional environmental theatre which has been performed for more than 1000 years is a good example to emphasize the relationship of ritual, environment, and performance.

In Taaziyeh, spectators explore the environment of performance as a social space. This 'found-environment' is part of their social environment. It could be in the street, in the street corner, or in front of a mosque. The space of performance in Taaziyeh is defined originally by the action of performers and spectators. This natural environment is the very place where the social and cultural relationship between audience and performance is shaped.

This paper concludes by the fact that environmental theatre receives its essence from a ritual ceremony that has been performed for more than 1000 years in natural spaces.

KEYWORDS:

- ENVIRONMENTAL THEATRE
- RITUAL
- DEATH
- PERSIAN PASSION THEATRE

INTRODUCTION

For many people, theatre is what they watch on stage while sitting on their chairs in front of the stage in conventional theatre buildings where the stage is separated from the auditorium. In this type of theatre, the relation between stage, performers and performance with the audience is frontal. The frontal proscenium stage in conventional theatre building was popular and common until 19th century and it does exist even today.

After WW2, new movements of experimental theatres began to attempt non-frontal use of space to alter the spectator´s relationship to the performance.

Although the mixing of actor and audience space has a long tradition in folk performance, it only became significant in modern experimental theatre from the early years of the 1960s, especially as a revolt against proscenium staging. The term **Environmental theatre** gained popularity during the late 1960s and 1970s, primarily due to the practice and theoretical writings of the American theorist/director Richard Schechner[1]. In the 1960s, certain happenings or environments were created within art galleries, just as 'open space' staging was created within a neutral theatrical space, but others were created in found spaces,' which could add their significance to the experience.

If we consider performance as an encounter between performers and the audience, where all are contributing to establish a relationship with one another, we may wonder what kind of relationship we encounter in the performance, and how the shape of this relationship has changed throughout performance history. Before the architectural theatre buildings emerged during the Italian Renaissance Theatre, this relationship between performers and audience was more in natural open environment, and more visible in the **ritual** performative events.

A **ritual** is a sequence of activities involving gestures, words, actions, or objects, performed in a sequestered place and according to a set sequence. Rituals may be prescribed by the traditions of a community, including a religious community. Rituals are a feature of all known human societies. They include not only the worship rites of organized religions and cults, but also rites of passage, and purification rites, dedication ceremonies, coronation, marriages, funerals and more. Even common actions like hand-shaking and saying "hello" may be termed as rituals.

Ritual performative ceremonies like child birth, wedding and funeral, have a significant role in human life. They are exactly what art generally seeks for. Along with birth and marriage, death marks a definite peak in an individual`s existence. The theme of death is a common subject in art, found in all styles.

Death is known to us simply as the end. The ending of individual existence. It is the period often placed before the close of the sentence and followed only by memories or after-effects in others. The curve of life is like the parabola of a projectile which agitated from its initial state of rest, rises and then returns to a state of repose.

To look for the connection between **Death, Ritual and Environmental Theatre**, we can study the origins of theatre through the history of religious rites of the first people who were watching performative events in a natural open environment, specifically, the connection and relation between Death, Ritual and Environmental Theatre in Persian Passion Theatre as a case study.

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1 Richard Schechner is University Professor Emeritus at the Tisch School of the Arts, New York University, and editor of TDR

> In Iran, Before Islam, ritual ceremonies originate from some famous mythologies and rites such as Sug-e-Siavush[2] based on the story from Shahnameh of Ferdowsi[3]. Siavush[4] is a major figure in Ferdowsi's epic, The Shahname. There is a document that people made a ritual ceremony because of Siavush death and it could be the first Taazieh in Iran 3000 years ago. (Beyzai, 1965)

A study on Iranian Theatre, written by Bahram Beyzai[5], is a valuable Iranian book about the origin and history of Persian passion theatre. It has not been translated into English yet. This paper takes some facts from this book.

Persian passion theatre, called Taaziyeh, is a type of performance that happens in the natural environment and observed by the people of that society. Taaziyeh is an indigenous form of Persian music theatre adopted from the religious ceremonies commemorating the suffering and tragic death of Hussein ibn Ali, the grandson of the prophet Muhammad. Taaziyeh is performed once a year.

Taaziyeh dramas are popular performances, and they are usually staged and watched in public sites. By observing Taaziyeh as an environmental theatre which happens in social spaces we may ask what the real essence of Taaziyeh space and its ritual death ceremony is, and how the environment of Taaziyeh affects the relationship between the audience and the performance; why this natural environment is capable of making cultural and social associations with its audiences during this ritual ceremony, and how this relationship works, especially in Persian passion theatre.

DISCUSSION

If we say that theatre comes from religious ceremonies and traditions, then we have to look back at religions in Iran. Iran had monotheistic (single-deity) religions unlike multi-deity religions in India and Greece. The single-deity religions in Iran like Zoroastrian and Islam have less dramatic aspects than multi-deity religions. Religious myths in multi-deity religions create stories between God and humans or between God and another God. But in single-deity Iranian religions, creating a story with the face and physical appearance of God and saints, or stories describing their behavior, is forbidden. Still, Persian mythology with traditional tales and stories of ancient origins did exist.

Islam was brought to Iran via the Arab-Islamic conquest in 650 AD. However, the achievements of the previous Persian civilizations were not lost, but were to a great extent absorbed by the new Islamic polity. Islam has been the official religion of Iran ever since. There are two main branches in Islam: Sunni and Shia. A split occurred shortly after the death of Muhammad over the question of who to lead the Muslims. After Islam came to Iran, the religious myth was created from the stories of the Battle of Karbala, which was the foundation or Persian passion theatre and the mourning group movement or Muharram festival for Shia.

MOURNING RITUAL IN MUHARRAM FESTIVAL

Taaziyeh usually takes place during Muharram festival, which begins on the first day of the Muslim month of Muharram and ends on the tenth day. The Muharram festival, which was started after 650 AD, has improved and found

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2 Mourning of Siavush.

3 Ferdowsi was a Persian poet and the author of Shahnameh (Book of Kings) which is the world's longest epic poem created by a single poet.

4 Siavush was a legendary Iranian prince from the earliest days of the Iranian Empire. Siavush is the symbol of the innocent who had been killed by Afrasiab.

5 Bahram Beyzai is a critically and popularly acclaimed Iranian filmmaker, playwright, theatre director, screencritically and popularly acclaimedwriter, film editor and master of Persian history and Islamic studies.

new forms over time, and we can still find some types of it nowadays in Iran. The last two days of Muharram festival called Tasua and Ashura. Tasua and Ashura ceremonies held every year in the form of mass folk follow and movement.

Muharram ceremonies are honored in many different countries, especially those with high concentrations of Shia Muslims. Widespread ceremonies take place in Iraq, Iran, India. Muslims in Iran, the vast majority of whom are Shias, celebrate the first ten days of the month of Muharram as a time of grief and lamentation for the killing of Imam Husayn.

There are some dramatic aspects that can be observed in these Mourning groups rituals such as: the group, harmonized, soft movements and specific rhythms; a type of group singing called Nohe in Persian, singing sadly about the injustice and cruelty suffered by the grandson of Mohammad; use of musical instruments like Senj and Dram as well as designed elements such as the symbol of the story of the Battle of Karbala.

TAZIYEH

"The Taziyeh of Iran is ritual theatre and derives its form and its content from deep-rooted religious traditions. But although it is Islamic in appearance, it is strongly Persian, drawing vital inspiration from its special political and cultural heritage. Its genius is that it combines immediacy and flexibility with universality. Uniting rural folk art with urban, royal entertainment, it admits no barrier between the archetype and the human, the wealthy and the poor, the sophisticated and the simple, the spectator and the actor. Each participates with and enriches the other" (Chelkowski, 1975: 4)

This traditional theatre tells the story of the battle of Karbala, in which Muhammad's grandson Hussein and his followers were killed by the second Umayyad caliph Yazid in A.D. 680

at Karbala, Iraq. For the Shi'a, Hussein's suffering and death became a symbol of sacrifice in the struggle between the right and wrong, justice and truth and injustice.

Participants and spectators do not view Taaziyeh as theatre, but rather as part of ritual mourning. Nevertheless, Taaziyeh has many theatrical conventions. The players do not memorize their roles, rather, they read them from strips of paper held in their hands called Tumar. The 'good' characters, on the side of Imam Hussein, chant their lines in classical Persian musical modes and wear green. The 'bad' characters declaim their lines in stentorian tones and wear red. Women's roles are taken by men who wear black and veil their faces. The performances offer a number of roles for children, played by young boys. Red symbolises death.

The design and setting in Taaziyeh utilize a special technique. This unique technique may not be accepted by western theatres or theatre designers, but Taaziyeh spectators accept the convention easily. They know the story and they use the symbolic elements in Taaziyeh to imagine the whole story in their mind. Taaziyeh spectators are not surprised when they see two actors holding a door to show the door of Emam's house, or when they see a chair in two separate scenes representing a throne in the court of Yazid, or when a bowl of water represents a river. Props, except the real ones such as swords, are all symbolic in this play.

To name a few more symbolic theatrical rules, the performers turn around the platforms once or twice to show the distance between two locations and passing of the time, and in order to determine the places as different cities in the performance, they announce the name of the location after turning around the platform. The musical intervals also show the passage of time.

Beside the dramatic aspects of this ritual ceremony the only conventional building built for Taaziyeh was Takiyeh Dowlat in Tehran in the Royal

compound. Takiyeh Dowlat was built upon Naser al-Din Shah Qajar's order in 1870. This building was inspired by Europe's opera houses, but it was destroyed in 1947. As Chelkowski observed, eventually, Takiyeh Dowlat's walls, canvas ceiling and circular stage were copied in Takiyehs all over the country. After this building was destroyed, social spaces for Takiyehs were built by society members, and these are the spaces for Taaziyeh and Muharram festival.
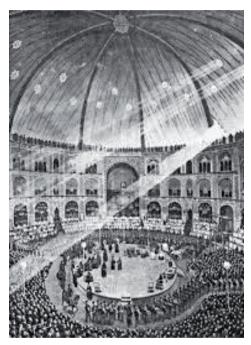

Figure 1. Kemal al-mulk's painting of Takiyeh Dowlat

THE ENVIRONMENT, DEATH AND RITUAL IN TAAZIYEH

Like Western passion plays, Taaziyeh dramas were originally performed outdoors, at crossroads and other public places where large audiences could gather. Performances later took place in the courtyards of inns and private homes, but eventually unique structures called Takiyeh or Husseinyeh were constructed by individual towns for the staging of the plays (Chelkowski 2005, 17).

In Taaziyeh, the main characters who articulate and transform the space into the stage for Taaziyeh are ordinary citizens of that district. Citizens of a particular town or village give contributions and work together to build and decorate the space for Takiyeh. These temporary places are built in each town district with the support of locals during the Muharram Ritual festival. People cooperate both socially and culturally, and women even prepare food and refreshments and serve them to the spectators as a ritual that happen every year in their life.

Figure 2. Ta'zieh ritual in Iran – A UNESCO Intangible Cultural Heritage

About the stage in this theatre, we can say that Taaziyeh is performed in a social environment that could be a circle spontaneously made in the street or on a street corner, and all these places exist and have their own identities before they are used as stages. The audience area in Taaziyeh is a small or huge circle around the performers. There is no predesigned set-up for this theatre. In Taaziyeh, there is no technological setting and even no light setting. Usually, the natural, outside light is used, and the performers use minimal, symbolic costumes and props to represent the characters and what they do.

Nowadays, we can still see this Ritual Environmental Theatre in social spaces in many cities in Iran. In contrast to the richness of Takiyeh's decorations, Taaziyeh stage design is rather minimal and symbolic. All Takiyehs, regardless of their size, are constructed as round theatres to intensify the dynamics between actors and audiences. "The spectators are literally surrounded by the action and often become physical participants in the play, in unwalled Takiyeh. It is not usual for combat scenes to occur behind the audience." (Chelkowski 2005:17)

Regarding the ritual and death ceremony, as Bahram Beyzai mentioned, Taziyeh originates from rites in Iran such as Sug-e-Siavush, a death ceremony 3000 years ago. This traditional ritual ceremony is the essence of Persian Passion play. The mourning ceremony for Siavush offers indication of some forms of Dramatic manifestation. This forms arised from the setting of Iranian myth as can be seen in *figure 3*.

In the explanation of this picture, it is said that men and women are weeping over Siavush's misfortune and beating their heads and breasts. A bier is being carried on men's shoulders, on which an actor who plays Siavush's role is lying. Probably some parts of Siavush's life were also acted out by this actor.

Some of these gestures like beating the head and breasts originate from 3000 years ago and are still in function during the Moharram festival and Taziyeh performance.

Peter Brook, who got inspired by Taaziyeh, mentioned:

> Taaziyeh is one of the strongest things I have ever seen. A group of 400 villagers, the entire population of the place, sitting under the tree and passing from roars of laughter to outright sobbing—although they knew perfectly well the end of the story—as they saw Hussein in danger of being killed, and then fooling his
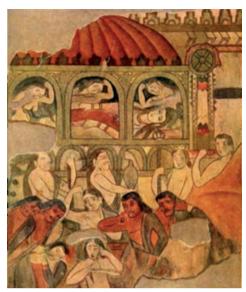

Figure 3. Painting of the archaeological image mourning for Siavush. (Archaelogy in the U.S.S.R, by A. Mongait)

enemies, and then being martyred. And when he was martyred, the theatre form became truth. (Chelkowski. 1979-255)

CONCLUSION

To take part in ritual performative events is to explore and celebrate the concept of how we relate to ourselves, to one another and to the world. The environment and ritual ceremony have a crucial role in making this social and physical relationship between a performance and audience.

When we look through the history of environmental theatre, we can see that different types of environmental theatre operated parallelly with the narrative western theatre. This paper, however, instead of focusing on contemporary environmental theatre, focused on, and researched only one ritual traditional environmental theatre which has been performed for more than 1000 years in order to emphasize the relationship of ritual, environment and audiences.

In Taaziyeh, as a ritual ceremony that happens every year in Iran, spectators explore the environment of performance as a social space. This social environment, could be in the street, in the street corner or in front of a mosque. Actually, the space of performance in Taaziyeh is defined originally by the action of performers and spectators.

The members of the society are the main performers in this ritual event: they gather in a dynamic circle and create and design the stage for this performance. They participate and celebrate their presence by exchanging cultural and social actions which originate from ritual rites and Death ceremony throughout history.

This natural environment is the very place where the social and cultural relationship between audience and performance is shaped by participating in this ritual performance.

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CONCEPTIONS OF TEACHING AND THEIR INFLUENCE ON THE CONTINUING PROFESSIONAL DEVELOPMENT PRACTICES OF TVET TEACHERS IN KENYA

Moses Gunda Njenga

Eötvös Loránd University, Doctoral School of Education

ABSTRACT

The general beliefs teachers hold about teaching influence and explain their professional practices. In particular, views about what it means to be a teacher influence the Continuing Professional Development (CPD) practices teachers adopt. Accordingly, policies and programs developed to help teachers engage in effective CPD must take existing conceptions about teaching into consideration.

However, it is unclear how Technical and Vocational Education and Training (TVET) teachers in Kenya think of themselves as professionals and how those conceptions influence their CPD practices. Adopting a qualitative approach, this study therefore investigated the beliefs Kenyan TVET teachers hold about teaching and how those beliefs influence their professional development.

TVET teachers in Kenya were found to view teaching as a purposeful activity of providing instruction to create competence, independence and dependability in students. As an activity involving instruction, good teaching is seen as the product of having good "delivery skills" which result from having good mastery of subject content knowledge and being able to present the knowledge to students. TVET teacher CPD is thus predominantly conceptualized as, and practiced as, any activity that leads to improved mastery of subject content knowledge, often at the expense of developing subject specific teaching methods. It is therefore recommended that pre-service TVET teacher education programmes and TVET teacher CPD programs in Kenya should help TVET teachers develop greater awareness of the value of subject specific teaching skills and avenues for their development.

KEYWORDS:

- VOCATIONAL TEACHERS
- PROFESSIONAL DEVELOPMENT
- TEACHER IDENTITY
- KENYA

INTRODUCTION

Teachers' professional identity strongly influences teaching practices, teachers' sense of well-being, and overall work effectiveness. Teachers' professional identity is therefore an important educational and research issue (Beijaard et al., 2004; Kane et al., 2002; Makovec, 2018; Rus et al., 2013). Accordingly, teachers' professional identity has been used to analyse and explain teachers' varied perspectives and behaviours, for example, how beliefs influence interpretation and adoption of policies (Noonan, 2019).

Teachers' professional identity consists of the views, images and beliefs teachers have about themselves. These views, images and beliefs influence all that teachers do, including the choice of content to teach and the teaching methods

to use, decisions regarding relationships they maintain, and whether and how to participate in professional development. Teachers beliefs and past experiences therefore act as filters and are used to justify present and potential actions (Fletcher et al., 2013; Izadinia, 2013; Noonan, 2019). In particular, teachers' identity influences their professional development and how they make sense of new experiences throughout their lives. Accordingly, to understand how teachers develop professionally and the diversity of the practices they use, teachers' professional identity must be understood. As noted by Noonan (2019), developing such an understanding entails focusing on teachers' past experiences, guiding beliefs, and how these are interpreted and used to guide teachers' professional development.

This article reports research findings from a larger study that sought to investigate the Continuing Professional Development (CPD) of Technical and Vocational Education and Training (TVET) teachers in Kenya. Specifically, the article presents findings on the interaction between Kenyan TVET teacher beliefs' and held meanings about their teaching role and their Continuing Professional Development.

TEACHER IDENTITY

Teachers' professional identity has been conceptualized and defined in many ways (Beijaard, 2019; Beijaard et al., 2004; Fletcher et al., 2013; Hanna et al., 2019; Rus et al., 2013). One such view sees identity as a concept of the self, i.e., an idea or a belief about the self, developed and enacted by the person. The conceptualization may be conscious or not, but it develops over time. The "self" can be defined as the entire person, i.e., as the union of a person's elements (body, emotions, thoughts, and sensations) that constitute the individual and embody the person (Beijaard et al., 2004; Hull & Zacher, 2007). Noonan (2019) defines a teacher's professional identity as a teacher's conceptions of self and role, highlighting

that professional identity relates to the roles teachers play as professionals. In Beijaard (2019), teacher identity relates to the overall conception teachers have of who they are as teachers, who they believe they are, and what they want to be.

Identity has also been conceptualized as a social entity, influenced by, constructed, and reproduced in social contexts (Izadinia, 2013); as a set of attributes that are externally ascribed for purposes of identification and differentiation (Sachs, 2001); as a set of socials roles and internalized expectations (Rus et al., 2013); and as narratives, i.e., constructed stories to live by (Beijaard, 2019; Howard, 2020). Beijaard et al. (2004) observes that while different definitions of identity have been offered, they all agree that identity is not a fixed attribute of a person. In fact, we are always in the process of developing that conception, connecting what we do and aspire to be with who and where we are at any given moment (Izadinia, 2013).

Borrowing from the many conceptualizations and noting the non-static and relational aspect of identity, Beijaard et al. (2004) and Mockler (2011) observe that identity development is a process of interpreting oneself and being identified as such at a given time and place. It is thus a process of answering the question "who am I here and now?" However, since identity development is a life-long process of interpreting and reinterpreting experiences, professional identity also answers to the question "who do I want to become?" But for teachers, these questions have to be answered in connection with the broader questions of the moral, normative, and practical purposes of education (Mockler, 2011).

PAST RESEARCH

Because teacher professional identity and beliefs are significant influences on teacher effectiveness, past research has focused on a wide range of aspects related to teachers' professional identity. Researchers have sought to identify the domains

of teacher professional identity (Hanna et al., 2019; Mockler, 2011, 2013; Rus et al., 2013), personal and social functions of identity (Dugas, 2021), and the role of context on the development of teachers' professional identity (Berger et al., 2018; Fletcher et al., 2013; Mockler, 2011; Tran & Le, 2018a) among other aspects.

Past research on teacher identity has tended to focus on the process of identity formation in student teachers and new teachers, owing to the strong impact these stages play on the development of teacher identity (Beijaard et al., 2004; Berger et al., 2018; Entwistle et al., 2000; Hanna et al., 2019; Izadinia, 2013; Noonan, 2019). However, some researchers have focused on specific groups of teachers. For example, Fletcher et al. (2013) focused on elementary school teachers while Howard (2020) and Pereira, Lopes, & Marta (2015) focused on teacher educators. Tran & Le (2018b) looked at how teaching international students influenced the professional identity of VET teachers while Kukkonen (2016) looked at how participatory pedagogy influences professional identity formation in VET student teachers. Makovec (2018) examined the extent to which teachers beliefs influenced the professional development of secondary school teachers in Slovenia.

PROBLEM STATEMENT

Professional identity of teachers influences role perceptions and the activities that should be prioritized and this in turn influences professional development. As such, professional learning and professional identity are intertwined. Accordingly, professional development must be looked at in relation to how teachers perceive themselves and their roles. However, while the value of professional learning is identified and effort put in ensuring professional development, knowledge about how professional identity influences professional development is limited (Tran & Le, 2018a, 2018b).

Lack of knowledge about professional identity and its influence on professional development is particularly scarce with respect to TVET teachers in developing countries. This was reaffirmed by Izadinia (2013) who in a review of literature on student teacher identity research observed that most studies on teacher identity concentrated on western cultural contexts. The research reported in this article sought to address this knowledge gap by focusing on how the professional identities of TVET teachers in a developing country influence their CPD practices.

CONTEXT OF THE STUDY

UNESCO defines TVET as a broad set of educational processes that in addition to the acquisition of general knowledge, skills and attitudes, enable the acquisition and development of technical competencies and an understanding of technologies and sciences related to occupations in various sectors of the economy and social life (UNESCO, 2001). Kenya's TVET sector lives to this definition and seeks to develop a broad range of competencies relating to engineering, agriculture, and business among others. At the post-secondary non-university level, Technical and Vocational Colleges (TVCs) offer three-year programs leading to the award of Diploma Certificates or two-year programs leading to the award of Craft Certificates. Students without secondary education may join Vocational Training Centres for Artisan Certificate courses.

In the recent past, the TVET sector in Kenya has undergone rapid expansion in both the range of available programs, number of training institutions as well as the number of students enrolled. However, despite the expansion, multiple challenges continue to compromise the quality of TVET in Kenya and its ability to support Kenya's social economic progress. TVET teachers are faced by an increasing number of students while being required to adopt new curricula and

teach relevant and up to date content using new teaching approaches. In the background of these demands is limited pre-service TVET teacher education (Akala & Changilwa, 2018; Masese, 2020; Ministry of Education, 2017; Njenga, 2021; Oketch, 2014).

As solution to these challenges, Continuing Professional development of TVET teachers has been championed. However, a clear understanding of what influences TVET teacher CPD in Kenya remains lacking. In particular, it is unclear how TVET teachers in Kenya think of themselves as professionals and how these conceptions influence their CPD practices. As part of a larger study focusing on the CPD practices of TVET teachers in Kenya, the present study investigated the beliefs Kenyan TVET teachers hold about teaching and how those beliefs influence their CPD.

METHODS

Adopting a qualitative approach, sixteen TVET teachers from six Technical Training Institutes in Kenya's Nairobi Metropolitan Area were interviewed on their beliefs about teaching and their CPD practices. The interviews explored how teachers conceptualize the teaching role and the aims of teaching as well as the competencies teachers identify as essential in playing the role of a TVET teacher. Further, the interviews explored what CPD teachers believe is needed to support the development of such competencies.

The interviews were conducted in the months of January and February 2021 after ethical permission and research license were obtained. With the help of a contact teacher at each institute, teachers were invited to participate, and after giving consent, the interviews were conducted individually with each teacher at the institutes. The interviews were recorded verbatim and later transcribed. Following Saldaña (2013), the interviews were coded and from an inductive analysis of the interview data, views about

teaching were identified and related to the stated CPD practices.

Of the sixteen teachers, nine were male and the rest were female. Three of the teachers had been working for less than five years, nine had been working for between six and twenty years and the rest had been working for more than twenty years. Ten of the teachers taught STEM related disciplines and the others taught in the business and communications fields. Eleven of the participants held administrative and non-teaching responsibilities in the TVCs.

FINDINGS

What does it mean to be a teacher?

When asked what it means to be a teacher, the majority of the participants described teaching in occupational terms. As one teacher put it, "I am a teacher because that is what I do". As an occupation, teaching was the meaningful activity they participated in on a regular basis to make a living.

For other teachers, teaching is a vocation, in the sense of what one is called to do in service to humanity. These teachers felt that they had always felt the inclination to work as teachers and would remain teachers despite the challenges that they face such as low pay. For one such teacher, teaching implied self-sacrifice to make others better. The second identity thus sees teaching as a service to society. Teaching is thus more than "teaching" in the sense of presenting information to students. Instead, teaching implies service to the society by supporting learners and helping them develop their characters. Service to society was also described in terms of supporting the new generation of knowledge and solving societal problems.

From these identities, specific aims for the role of teaching could be identified. Teaching in TVET is viewed as a purposeful activity that seeks to develop useful competences in students. The goal of teaching is however not merely to develop competencies by

presenting information. Instead, teachers seek to develop the characters of their students to enable them to lead successful lives after school. The excerpt below crystallizes this view:

INTERVIEWER:

So, what do you think it means to be a teacher, and specifically to be a professional teacher?

MaTTi-2:

To model and help people build their careers, impart knowledge and skills, and change their character.

It is also clear that teachers identified their work as career development, where they work to help students build their careers. A common statement describing the goal of teaching was to produce positive outcomes in the lives of students.

To achieve the goals and aims of teaching, TVET teachers work to transfer and impart knowledge in their students. They thus have to teach what is relevant and useful to their students. Given that students have to pass examinations to get certified as competent before starting their careers, teachers have to work to ensure that their students pass their examinations. One teacher described teaching as examination focused:

MiTTi-3:

….because most of the time, you will be skewed towards teaching what you know the students will be examined on. Most of the times, you are geared towards helping the students to pass.

But teachers must also develop appropriate values in their students: values and attitudes needed for successful careers. Teachers said they do this by modelling these values and by engaging in ethical conduct. TVET teachers see themselves as being involved in character development where they instil right and appropriate values. They therefore talk to and guide their students.

Thus, one teacher identified guidance and counselling as a core part of teaching even if one is not specifically trained in Guidance and Counselling.

ThTTi-2:

I do a bit of guidance, though I am not so much into it, because I have not studied guidance and counselling, I attend seminars. But every teacher is a guidance counsellor (sic). That is something that should be in all of us.

What are requirements of being a good TVET teacher?

To play the above roles effectively and achieve a professional teacher identity, TVET teachers must have some specific attributes and abilities. Good TVET teachers were described as dynamic, confident and ethical individuals who had mastered the content they teach and could manage their students and classrooms. A constructivist conception of teaching was apparent with teachers being required to focus on the needs of learners. As one teacher put it, a good teacher should be able to reach students at their level.

MiTTi-2:

….the ability to deal with different groups of people, understand them, and to reach them at their level. It should be centred on the learner. You know when you understand the learner; you should be able to reach them at their level.

Having described what it means to be a TVET teacher, participants were then asked to describe the knowledge, skills, and values that one needs to be a good TVET teacher. Participants identified mastery of content and delivery skills as the two most critical requirements for successful teaching. Mastery of content was defined in terms of having mastered the theoretical content a teacher is supposed to teach, as well being skilled in the trade area one is required to teach.

It is however not enough to have mastery of content. Knowing how to present the content to students and help students understand it was

also identified as a core requirement of good TVET teachers. The term frequently used to describe this requirement was "delivery skills". An analysis of the responses shows that teachers see mastery of content and delivery skills as closely related and inseparable. In many of the cases, good mastery of content combined with teaching experience was seen as automatically leading to good delivery skills.

Given the constructivist conception of teaching identified above, having an ability to focus on the needs of the students was another stated requirement of good TVET teachers. Good knowledge about students and having the ability to properly interact with students was thus identified as an essential requirement for being a good TVET teacher. With respect to handling students, participants frequently identified classroom management skills as essential. Further, with respect to the identity of teachers as Role-Models, participants identified "a good character" as essential. Being ethical and having knowledge of teaching ethics was identified as another requirement.

Related to these, but less frequently stated were pedagogical knowledge and pedagogical content knowledge. Other required skills were administrative skills related to teaching such as content planning, creating and keeping of teaching records, evaluating learning, and knowledge of educational policies. To be dynamic, teachers are required to have life-long learning skills, referring to being able to learn on their own and keep up to date with technological developments.

How does one become a TVET teacher?

The last research question in this study focused on how teacher identity influences the continuing professional development of TVET teachers. Participants were thus asked to describe the processes through which they developed the knowledge, skills and values that one needs to be a teacher, as well as how they maintain their professional knowledge.

Almost all the participants, even the ones who had not undergone Initial Teacher Education, identified Professional Training as critical. The second source of teacher knowledge was experience. Participants felt that Initial Teacher Education is never enough. A new teacher has to be mentored and supported to start teaching. With respect to maintaining professional knowledge, continuing professional development was identified as essential.

How is CPD conceptualized?

The continuing professional development of teachers was predominantly conceptualized as, and practiced as, any activity that led to improved delivery of knowledge and skills to students. As one teacher put it, delivery in class was critical and this was her main motive to participate in CPD.

MuTTi-2:

My motivation to pursue these? I think for me, delivery marks everything.

These activities included information search, professional dialogue with colleagues and attending workshops and conferences.

However, given the current examination system that focuses on mastery of theoretical content, participants indicated that they focus their CPD on theoretical content, while remaining desirous of taking more practical oriented CPD. Teachers are thus forced to make a choice between being ethical trainers who prepare their trainees for the real situation that awaits the students or be shrewd guides who help their charges get the papers they need to access jobs:

MiTTi-3

If I know that an area is not going to be examined, then I would cheat you to say that I would stay there. Because at the end of the day, students are here for a limited time and they are also interested in a good certificate and there is also the scope and the syllabus. So I do not go where the examination will not focus. Unless I am giving life guidance voluntarily.

As one teacher pointed, teachers necessarily have to focus on ensuring that their students pass their examinations:

MuTTi-3:
> We draw a structure to win instead, and winning is passing exams out

However, teachers also had a more utilitarian view of Continuing Professional Development, and viewed CPD as an avenue to career growth. Professional development was thus interpreted in terms of activities that enable career progress, hence the use of formal education leading to defensible certificates such as university degrees. For some teachers, CPD was a way out of the boredom and monotony of teaching.

DISCUSSION

From the analysis of the data, it is clear that TVET teachers in Kenya view teaching as a purposeful activity that seeks to produce independent and dependable individuals. Achieving this aim is seen as involving two main activities: Training and Character Development. Thus, TVET teachers work as trainers, who instruct with the aim of imparting knowledge and helping their students develop technical competencies. As character developers, they seek to help their students develop desirable values and ethics. TVET teachers are thus role models, guides, and counsellors. This finding mirrors the finding by Köpsén (2014) that VET teachers view their work as involving more than just teaching. Instead, working as a VET teacher involves fostering students to become fully engaged students, preparing students for a working life, and offering guidance into responsible adulthood. Similarly, Tyler & Dymock (2021) found that in constructing their vocational identity, vocational teachers saw themselves as professionals with a responsibility to facilitate learning while Tran & Le (2018b) found that VET teachers view themselves as mediators and facilitators.

From the analysis of the data, it is also clear that the Trainer role has primacy. Accordingly, good teachers are defined as those having well developed "delivery skills". Delivery skills are interpreted as having good mastery of content and being able to present the content clearly to students. In a similar study focusing on how Australian VET teachers define a good teacher, Smith & Yasukawa (2017) found that disciplinary expertise as well as good pedagogical competencies are seen as essential for one to be a good teacher. However, and in agreement with the finding that evaluations practices heavily impact teaching practices in Kenya (Somerset, 2011; Wasanga & Somerset, 2013), delivery skills are not an end to themselves. Instead, delivery skills are only good if they result in students passing in their examinations. Teachers thus choose to direct their time and effort in learning what will not only make them competent, but that will ensure that students pass their examinations.

Continuing Professional Development of TVET teachers is thus predominantly conceptualized as, and practiced as, any activity that leads to improved delivery of knowledge and skills to students. Because good delivery skills are seen chiefly as a product of good mastery of content, teachers seek to develop their delivery skills by focusing on improving their subject content knowledge.

TVET teachers in Kenya thus focus their CPD on subject content knowledge because that is what they assume they need to know to help students learn. While they speak of delivery skills, they seem unaware that the desired delivery skills can be developed by learning pedagogical techniques specific to the content they teach. This unawareness is an indication that Initial Teacher Education fails to develop sufficient awareness of pedagogical knowledge and pedagogical content knowledge. It is instructive that few of the respondents identified these as critical forms of knowledge teachers should develop. Earlier, Oroni (2012) found that the pre-service teacher education curriculum in Kenya does not focus

extensively on subject specific teaching methods. This is especially important given the observation by (Hoekstra et al., 2018) that vocational teachers face often face challenges in accessing training on pedagogy and subject specific teaching methods due to the specialized nature of their subjects.

SUMMARY AND CONCLUSION

The current study sought to identify how TVET teachers in Kenya conceptualize the teaching role and how those conceptions influence their CPD practices. While some TVET teachers view teaching from a practical perspective as an occupation, others have a loftier view, regarding teaching as a vocation and as a chance to serve society. Irrespective of their view of what being a teacher means, working as a TVET teacher implies a dual role of modelling and producing ethical conduct in students while imparting students with knowledge and skills necessary for successful careers. Based on the focus on instruction, TVET teacher CPD in Kenya mainly serves to support the development of delivery skills, while also serving utilitarian purposes such as supporting career progress or as a solution to boredom and burn-out.

The need to help students pass their examinations and the view of good teaching as being dependent chiefly on the mastery of subject-content knowledge has led to CPD practices that focus mainly on the development of subject content knowledge at the expense of pedagogical and subject specific teaching skills. Pre-service teacher education programmes and CPD programs for TVET teachers in Kenya should thus focus on helping TVET teachers develop the competences and knowledge teachers identify as essential while placing greater emphasis on the development of subject specific teaching skills.

While the findings are valid in themselves, further research utilizing other methods is called for to verify them. In particular, the influence of career stage and educational qualifications

on conceptions of teaching and CPD practices should be investigated. Kane et al. (2002) are however critical of research that relies only on what teachers say without using other methods to observe teacher practices and corroborate its findings. Accordingly, further research using other methods is called for.

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URBAN DEVELOPMENT OF PALMYRA DURING THE ROMAN ERA

Ousama Rumayed

Pázmány Péter Catholic University, Faculty Of Humanities And Social Sciences

ABSTRACT

Palmyra lies in the heart of Syria, an oasis in the midst of the desert, the iconic site of evidencing human settlement since the Paleolithic & Neolithic eras, and one of the important cultural centers of the ancient world. In 1980, it was registered on the world and national heritage list.

Cultural heritage has fallen under the threat of being damaged and erased due to armed conflicts. The devastation of Syria's war has deliberately and systematically targeted archaeological monuments dating from the Pre-historic, Byzantine, Roman, and Islamic periods, with no distinction being made of the cultural, historical, and socio-economic significance of such sites.

Currently, giving proposals for post-war reconstruction have already started, so it is necessary to have and collect sufficient knowledge about each heritage before giving any proposal. Moreover, there is a need to understand the meaning of cultural heritage, so that we understand its authenticity and differentiate the authentic parts from the ones that are not. However, we should realize and understand what we need to preserve. Is it the authenticity? The symbols? or the country's identity?[1]

Although many objects, monuments, and archeological sites that were partially destroyed can be recovered and restored in the post-war conservation phase. However, many other monuments have been severely damaged or completely destroyed so it is difficult to be restored, and its loss had a bad impact on the cultural heritage.

There is a need to acquire and gather sufficient knowledge about the historical urban development of the archaeological site, building materials, and urban style of each monument in accordance with its identity and authenticity, before submitting any proposal for its reconstruction or restoration and preservation.

KEYWORDS:
- TADMOR
- PALMYRA
- TEMPLE
- BEL
- BAALSHAMIN
- ROMAN,
- THEATRE
- GRAND COLONNADE
- TETRAPYLON
- ARCH OF TRIUMPH
- URBAN,
- OASIS
- AFQA

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1 Abdulmawla, L. Return or Change, Syria Post War Urban & Cultural Reconstruction Strategy, *(Politecnico Di Milano, 2017)*, Italy, P2
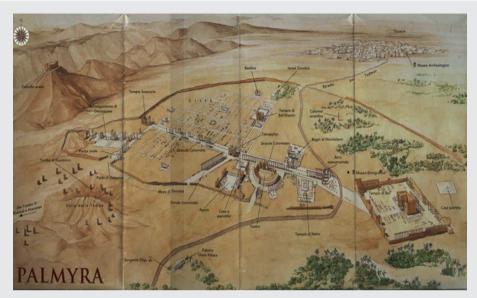
Figure 1. Palmyra Tourist Map, Archive © Directorate General of Antiquities &Museum (DGAM)

I. OVERVIEW OF PALMYRA

Palmyra, the iconic site of evidencing human settlement since the Palaeolithic & Neolithic eras and one of the important cultural centers of the ancient world, lies in the heart of Syria, at the crossroads of several civilizations.

During the 1st and 2nd centuries, Graeco-Roman techniques, local traditions, and Persian influences interacted together to create the unique art and architecture of Palmyra.

The arch of triumph, the grand colonnaded street, the temple of Bell, the Agora, the Roman theatre, Diocletian's camp, and architectural ornaments including unique examples of funerary sculpture, are splendid examples of this irreplaceable original Graeco-Roman art style.[2]

II. GEOGRAPHIC SETTING

Palmyra is a plateau on the surface of which are two mountain ranges that branch out near Damascus from the eastern Lebanon mountain range.

The geographic basis is a spring of water located at an obligatory mountain crossing in the desert of the Levant, at an almost equal distance between the Syrian cities, 230 km northeast of Damascus, 158 km east of Homs, and 210 km southwest of Deir Ez-Zour. It is 406 meters above sea level, and the highest peak is about 1,400 meters in El-Belaas.[3]

This spring has created a green oasis that became a place of rest between Iraq and the Levant, and a caravan's station between the Arabian Gulf, Persia, and the Mediterranean, and grew steadily on the trade routes, marking it the crossroads of several civilizations.[4]

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2 Ball, W. *Rome in the East, The transformation of an empire,* (Routledge, London, 2000), p.74.

3 Abdul Salam, A. Physical Geographical Environment in the Tadmorian Desert, and the Silk Road, (*Palmyra and the silk Road, Les Annales Archeologiques Arab Syriennes, Vol: XLII, DGAM*, 1996), PP.27-29.

4 Mari, A. Palmyra as an Important Station on the Caravan's Road during the Sec. and Millennium B.C, (*Palmyra and the silk Road, Les Annales Archeologiques Arab Syriennes, Vol: XLII, DGAM*, 1996). PP.135-37,

III. HISTORICAL FRAME

III.1. HISTORICAL BACKGROUND

The history of Palmyra dates to the late third millennium BC. Its name (Palmyra) appeared on a plastered clay plate found in Cappadocia (Anatolia), in the documents of Mary during the reign of Hammurabi in the 18th century BC., and the Assyrian documents dating back to the 12th century BC.[6]

The name (Tdmrta) is Aramaic, the Greeks and Romans called it Palmyra, in reference to the city's palm trees, which are abundant in the oases.

III.2. RULERS DURING GRAECO-ROMAN AND PERSIAN PERIODS

Since the destruction of the city of Petra, the capital of the Nabataeans in AD 106, the trade routes were completely transformed into Palmyra. The Senate ran all the issues of power and government and was then granted by emperor Caracalla in CE 212, the title of the perennial, which won the status of Rome and thus won many privileges benefiting from the presence of Arab emperors ruling Rome.[7]

It gained its great reputation during the reign of **King Uthina** (AD 252–268), who defeated Shapur (king of the Persians) in AD 265. Rome

Figure 2. Palmyra, Map of Syria, (2014) © United Nations Institute for Training and Research, (UNITAR)⁵

5 UNITAR. Satellite-based Damage Assessment to Cultural Heritage Sites in Syria , *United Nations Institute for Training and Research*, (UNITAR, 2014), P9

6 Ball, W. *Rome in the East, The transformation of an empire*, P.74.

7   J. M. Kropp, A. & Raja, R. *The Palmyra Portrait Project, (IFPO* - Institut français du Proche-Orient, 2014). P.9.
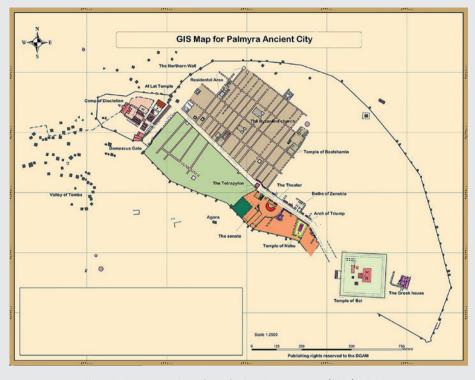
Figure 3.   Documentation Palmyra by GIS, IT Department, (2014) © DGAM

granted him the title of "Reformer of the East" and the vice emperor and commander of the armies in natural Syria. He also took the title of "king of kings".

His wife, **Queen Zenobia**, took over the throne after her husband Uthina was killed on behalf of her son, and called herself the Augusta. In AD 271, she gained independence from Rome, and controlled the entire east from the Gulf and the Levant to Egypt and Anatolia, and took the titles of the Roman emperors, which made Rome consider this act a challenge to its authority.[8]

Aurelian, the Roman emperor, who considered Zenobia's act as a defiance of his authority. He ordered an army under his leadership to confront Zenobia, forcing her armies to withdraw from Asia Minor and Egypt. In AD 273–274, after severe battles, Palmyra fell, and he seized its territories, leading the city to lose its political and commercial role.

Diocletian (AD 284–305), the Roman emperor, who reconstructed a large part of the city to be one of the most important stations on the commercial road, known as Strata Diocletiana.[9]

Justinian (AD 527–565), the Roman emperor, who repaired the defensive walls strengthening them with semicircular towers, and renovated water channels.[10]

8   J. Andrade, N. *Zenobia, Shooting Star of Palmyra*, (Oxford University Press, London, 2018). Pp. 117-20.

9   Cussini, E. *A journey to Palmyra*, (Koninklijke Brill NV, Leiden, The Netherlands, 2005). P. 220.

10 Ibid: P221

IV. ARCHITECTURAL & URBAN PLANNING OF THE ANCIENT ZONE

Palmyra developed during the Graeco-Roman period. It extended between the temple of Bel and Afqa spring; the city also included the oasis and the tombs located outside the walls.

The hard limestones used to build the visible parts of the buildings were brought from the stone quarries located 10 km to the north of the city. The stone sections of soft limestone used in the foundations were obtained from the quarries of Jabal al-Tar (behind the Arab castle), 5 km northwest of the city.[11]

The old Palmyrene houses are located in the northern part of the colonnade street. The houses were made from mud brick, with a high degree of comfort; the rooms were poorly ventilated and built around an internal courtyard, and the windows were small to protect from the summer heat and the winter cold. The external walls of the houses were blank with only doorways to the street.[12]

However, this type of house no longer exists. The city has developed in multiple stages, starting from a small village between the ruins, to having now a new Tadmor city that is considered the living city, where the houses are cement boxes.

The Palmyrene construction traditions were based on three considerations stemming from:
1. Palmyra Religion.
2. Practical Methods.
3. Urban Landscape.

IV.1. PALMYRA RELIGION:

Palmyra's religion consisted of religious ideas that prevailed in Syria, Mesopotamia, and the Arabian Peninsula. No temple dedicated to a Graeco-Roman deity or any emperor, or any god worshiped by Roman military divisions, have been found. This is because ancient Palmyra worshiped its gods exclusively and placed them within many huge stone temples to protect them from all harm, and gave them a full priority, over the rest of their other civilian facilities and their private homes.[14]

Figure 4. Palmyra Landscape Aerial View, Archive © DGAM

11 Kteifane, L. DGAM. Retrieved from DGAM, (2013).: *http://www.dgam.gov.sy/index. php?d=307&id=695*

12 Browning, I. *Palmyra*. Chatto & Windus , (London. 1979), pp. 84-92

13 Wielogsz, D. *"Tadmor nel deserto. La città greco-romana." In Siria: Dalle antiche città-stato alla primavera interrotta* di *Damasco*, (edited by M. Guidetti,. Milano: Jaca Book, 2006), PP,41-60.

14 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, (*Palmyra and the silk Road, Les Annales Archeologiques Arab Syriennes, Vol: XLII, DGAM*, 1996), P221.

Figure 5. 3D Model of Tempel of Bell, Palmyra Museum, Archive © DGAM

The temple of Bel is the largest temple ever devoted to the Mesopotamian god Bel. This temple was built in the east of the city not far from the oasis and oriented precisely east-west and north-south.[15]

The completion of the temple of Bel was a very important architectural event in the middle of the second century, as it is well-known that it disseminated the Corinthian capital during the first and second centuries in all Syrian buildings.

The influence of the temple of Bel in Palmyra was evident in the renovation and decorations of the other temples, in the addition of decorative niches in their sanctuaries, enclosing its buildings with corridors and enabling the masses of worshipers to gather under their shadows and expanding their capabilities in organizing religious processions.[16]

Figure 6. The Ionic Capital, Palmyra, (2005) ©DGAM

Figure 7. The Corinthian Capital, Palmyra, (2005) ©DGAM

15 J. Andrade, N. *Zenobia, Shooting Star of Palmyra*, P.31

16 Ball, W. *Rome in the East, The transformation of an empir*e, Pp.360- 84

IV.2. PRACTICAL METHODS:

In order to understand the new urban plan established at that time, it must be mentioned that the settlement had two axes in accordance with

- Freshwater spring in the west.
- Afqa spring near Jabal Al Mentar in the east.

The establishment of a new urban settlement included the construction of a very wide street from south to north to be used instead of the old caravan route from Homs and Damascus through the valley of graves on their way to the Euphrates or the Arabian Gulf.[17]

This transverse street, with a portico on its eastern and western sides, 230m in length and 21m in width, began at the south, from Damascus gate.

An oval area extended behind it, which was known as the oval forum. The writings found on its columns cited that the transverse street had two functions:

- **Commercial**, supported by the 20 shops that extend east of the forum and from the beginning of the street.
- **Religious**, researchers believe that the caravans from the Levant headed to the temple of Lat in religious processions to have the protection of the goddess before passing the desert.[18]

Since the western housing area is limited to landfills and rocky highlands, its inhabitants have only found eastward expansion for the settlement. Also, it is thought they pulled the water through an underground canal from the freshwater spring. Aerial photographs supporting probe work showed that a plan was taken to draw ten islands of different lengths, parallel to the transversal street, they are oriented north-south, separated by roads with a width of 5.4 m. To the south, these islands complement five other islands that have roughly the same direction but are wider than the first.[19]
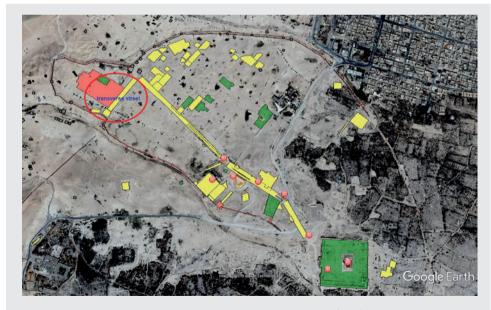

Figure 8. The Transverse Street, Google Earth of Palmyra, (2018) © Author

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17 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, P224

18 Wielogsz, D. *"Tadmor nel deserto. La città greco-romana." In Siria: Dalle antiche città-stato alla primavera interrotta di Damasco*, PP.41-60.

19 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, PP.224-26

The second destructive area where the stone buildings were found during Hadrian's reign lies east, at the junction of convoys from the east with convoys from the Levant, in the valley adjacent to Jabal al-Mentar. It is the place where the Agora constructed the public square and its warehouse the Senate building.[20]

The grand colonnade constitutes a characteristic example of a type of structure that represents a major artistic development. The grand monumental colonnaded street, with the covered side passages, and subsidiary cross streets, together with the major public buildings, form an outstanding illustration of architecture and urban layout at the peak of Rome's expansion and engagement with the East.[21]

The construction of the grand colonnade stretched over 1200 m and included three sections:

Section A:
It starts from north of the transverse street and heads southwest (600 m), to the oval square where there is the Tetrapylon.

Section B:
It slightly changes its direction after the oval square to the southeast (300 m) and ends with the arch of Triumph.

Section C:
It goes south towards the gate of the temple of Bel.[22]

IV.3. URBAN LANDSCAPE

Palmyra's architecture was creative and adapted to the local dynamics and constraints. It was neither Hellenistic nor Roman, but a combination of urbanization with predominant originality.

According to scholars, Palmyrene engineers adopted the theory of defragmenting the perspectives and dealing with each part of the

Figure 9. The Grand Colonnade Street Aerial View, Palmyra, Archive © DGAM

space alone, by capturing the vision through building several monuments and using decorative elements, which created the originality of the initial art and architecture of Palmyra.[23]

V. WATER SUPPLY IN PALMYRA

According to the Palmyrene Tariff (The tax law of Palmyra), there were many sources of water supplying the city during that period.[24]

The first source is Afqa. The water was drawn up from the water layer by natural underground canals to the wells. No aqueduct conducting water to the city was built in the Roman period.[25]

The second source is at Gebel Rueisat. It lays 9 km west of the city and is not visible now, the water was caught at the foot of the hill by five canals carved in the rock and flowed down to the

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20 Ibid:263-85

21 Sommer, M. *Palmyra A History*, Routledge of the Taylor & Francis Group, New York, London.(2018) , P 171

22 Ibid.:224

23 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, PP.224-26

24 Gawlikowski, M. *Recueil d'Inscriptions Palmyréniennes provenant de fouilles syriennes et polonaises recentes à Palmyre*, Paris,1974, PP.106-27

25 Zuchowska, M. *The Archaeology of Water Supply*, Archaeopress, Oxford, 2015, England.pp 80-120
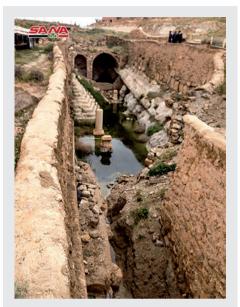
Figure 10. The Ancient Entrance to Afqa Grotto, Palmyra, (2019) © Syrian Arab News Agency (SANA)

underground pool, then it was conducted to the city through the underground aqueduct.[26]

The third source is the Biyar al-Amye, north of the city. The place from which the source flows out is currently incorporated by the modern military base.[27]

The last is the most mysterious source, in a place somewhere southwest of Palmyra. people used to stop to water the camels, few steps led down to the underground aqueduct made of stones.[28]

VI. SIGNIFICANT MONUMENTS

TERRORISM DAMAGES

On May 21st, 2015, the situation dramatically worsened, reaching alarming levels in the vicinity of the ancient city of Palmyra with unpredictable consequences following ISIS militants' attack on the city.[29]

THE ARCH OF TRIUMPH

The arch of Triumph is one of the most famous monuments of Palmyra. The uniqueness of this arch comes from the transitions between its two façades, the northern and the southern ones. Its splendid decorations constitute a part of its.

Figure 11. The Arch of Triumph, Palmyra, Archive © DGAM

On Oct 4th, 2015, the central arch and its smaller flaking arches were destroyed by dropping its middle spans, leaving its columns standing.[30]

Figure 12. The Debris of The Arch of Triumph, after It was Destroyed by ISIS, Palmyra (2017) © DGAM

26 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, P224
27 Wielogsz, D. *"Tadmor nel deserto. La città greco-romana." In Siria: Dalle antiche città-stato alla primavera interrotta di Damasco*, PP.41-60.
28 Abdulhak, S. Palmyra in the architecture and urbanism of the first centuries AD, PP.224-26
29 Whitmur, J Palmyra, lessons from history, (*Les Annales Archeologiques Arab Syriennes, Vol: X, DGAM, Syria* 1960) PP327-32
30 Shaheen, K. ISIS destroys tetrapylon monument in Palmyra. The guardian. Retrieved (2017), from *https://www.theguardian.com/world/2017/jan/20/isis-destroys-tetrapylon-monument-palmyrasyria*

TEMPLE OF BAALSHAMIN

The temple of Baalshamin, God of rain and fertility, is located in the northern quarter of the ancient city, northeast of the Tetrapylon.[31]

Figure 13. View of The Porch with Free-Standing Columns, and A Pilaster Visible on The Flank, Temple of Baal shamin, 1st-century C.E, Palmyra. © Juan Llanos CC BY-ND 2.0, CC BY 2.0

Although the cella of the temple was destroyed on Aug 23rd, 2015, the northern and southern columns located just next to the cella survived the explosion and remained in good condition.[32]

Figure 14. The Debris of The Cella of Baalshamin after It was Destroyed by ISIS, Palmyra (2017) © DGAM

THE CELLA OF TEMPLE OF BEL

The temple of Bel is considered one of the most famous religious temples in the ancient east.

Figure 15. The Cella of Temple of Bel, Palmyra (2005) © DGAM

Unfortunately, on Aug 18th, 2015, the cella was completely destroyed and the stones were turned into small fragments spread around the site.

Figure 16. The Debris of The Cella of Temple of Bel after It was Destroyed by ISIS, Palmyra (2015) © DGAM

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31 Collart, P. *Baalshamin temple in Palmyra, Les Annales Archeologiques Arab Syriennes, Vol : VII, DGAM, (Syria, 1957), P 230, Syria*

32 UNESCO. *Technical Assistance Workshop to World Heritage Sites in Syria, 13-15 December 2016*

THE TETRAPYLON

The Tetrapylon is built on an oval square, located in the mid of colonnade street to the northwest. It is composed of four square blocks, each of them supports four granite Corinthian columns. These sets of columns hold a decorative ceiling.

Figure 17. The Tetrapylon, Palmyra, Archive, (2001) © DGAM

Notably, 15 columns of the Tetrapylon are copies, counter to the original ceiling, which was destroyed between December 26th, 2016, and January 10th, 2017, while the bases of the columns are intact and four of the columns are still standing in their places.[33]

Figure 18. The Debris of The Tetrapylon after It was Destroyed by ISIS, Palmyra, Archive (2017) © DGAM

THE ROMAN THEATRE

The theatre is located on the left side of the colonnade street between the Tetrapylon and the Triumphal arch, with a semi-circular form 50 meters wide, composed of thirteen steps.[34]

Figure 19. The Stage of The Roman Theatre, Palmyra, Archive © DGAM

Due to the ISIS occupation of the city in January 2017, the theatre was damaged, where a part of the façade upper niche was destroyed, and a part of the platform was damaged because of this destruction.

Figure 20. The Roman Theatre after It was Destroyed by ISIS, Palmyra (2017) © DGAM

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33 DGAM, Latest News from Palmyra, (2017) http://dgam.gov.sy/?d=314&id=2242
34 Kutiefan, *DGAM*. Retrieved: http://www.dgam.gov.sy/index. php?d =307&id=695

THE SIX TOWER TOMBS

Among the tomb types from Roman Syria are the curious "tower tombs" of Palmyra, which are unparalleled in the architecture of the Roman Empire.

Figure 21. The Valley of Tombs, Palmyra, Archive© DGAM

Between the end of August and the beginning of September 2015. 6 tower tombs in Palmyra, were destroyed completely, by the terrorist militants of ISIS.[35]

Figure 22. The 6 Tower Tombs after They were Destroyed by ISIS, Palmyra (2017) © DGAM

VII. CONCLUSION & LESSON LEARNED

This city has shown great flexibility, when its public religious, civil, and private buildings were constructed, as it did not strictly follow the global urban rules respected by many other cities.[36]

The city had some criticism directed at these rules because they were set in different kinds of environments. It did not use the Roman scheme of two principal streets oriented in the cardinal directions and the orthogonal grid of streets. Had the city followed this scheme like its neighbor Dura-Europos, it would have been at risk of the intensity of heat, high winds, and topographic terrain. It had to remain attached to its oasis and not move away from it, which explains the multiplicity of its building's axes. This was not a defect because most of the Graeco-Roman cities and even Rome itself had their own urban trends.

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35 DGAM Archive, *Satellite imagery of 6 tower tombs in Palmyra destroyed by ISIS, (2015).* http://dgam.gov.sy/index.php?d=314&id=1798

36 A. R. Colledge, *M. Roman Influence in the Art of Palmyra, (Palmyra and the silk Road, Les Annales Archeologiques Arab Syriennes*, Vol: XLII, DGAM, Syria, 1996), PP.363-71

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DGAM Archive, *Satellite imagery of 6 tower tombs in Palmyra destroyed by ISIS*, (2015). http://dgam.gov.sy/index.php?d=314&id=1798

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INVESTIGATION OF THE CYTOTOXICITY MECHANISM OF NOVEL SYNTHETIC CANNABINOID, THJ-018, AND ITS SECONDARY METABOLITES ON SH-SY5Y NEUROBLASTOMA CELLS IN VITRO AND IN SILICO

Sakenov Rauan

University of Pécs, Doctoral School of Interdisciplinary Medical Sciences
Instituto Superior De Ciências Da Saúde Egas Moniz, Caparica, Portugal

Couceiro Joana and Quintas Alexandre
Instituto Superior De Ciências Da Saúde Egas Moniz, Caparica, Portugal

ABSTRACT

The aim of this study was to investigate cytotoxic effects of novel synthetic cannabinoid, THJ-018, on human neuroblastoma cell line, SH-SY5Y. We demonstrate that at concentrations from 1.0 to 100.0 μM, THJ-018 has complex toxic effect on the viability of SH-SY5Y cells in terms of cellular numbers and respiration in vitro, stimulating increase in cellular population up to 126.0%±17.1% at lower concentrations below 25.0 μM and increase in cellular respiration in terms of formazan production up to 124.0%±16.1% at higher concentrations from 25.0 to 100.0 μM. By contrast, the mixture of combustion products of THJ-018 showed constant concentration-dependent cytotoxic effects on SH-SY5Y cellular viability at concentrations from 1.0 to 100.0 μM, in terms of the percentage of viable cells and formazan production, which decreased from 100% to 26.7±5.9% and from 100% to 32.8±7.2% correspondingly, if compared to negative control. The results of our docking study in silico showed that secondary metabolites and combustion products of THJ-018 have greater affinity to cytochrome c1, Heme C of human mitochondrial respiratory complex III and iron-sulfur center, chain P, which may impact the function of electron transport chain, Q-cycle, production of reactive oxygen species and other functions of the mitochondria.

KEYWORDS:

- THJ-018
- SYNTHETIC CANNABINOIDS
- FORENSIC TOXICOLOGY
- NEUROTOXICITY
- TOXICOLOGY
- SH-SY5Y CELLS

1. INTRODUCTION

Around 15 % of young population (15-34 years of age) and 27 % of older population (15-64 years of age) used cannabis in EU in 2020, what makes it the dominant illicit substance in use:

about 1% of adult European population use cannabis almost daily for 20 days or more [1]. The importance of a more extensive research on toxicity of synthetic cannabinoids (SCs) is explained by more toxic effects of their secondary metabolites than parent compounds, which is not observed in the case of the consumption of natural cannabis. Moreover, with two new SCs on the grey market every month, better understanding of neurotoxicity, protein and genetic toxicity of novel SCs, and study of their metabolism are needed for application in clinical studies and forensic investigations [2].

Pharmacological action of SCs includes psychotropic and immuno-tropic effects depending on the interaction with cannabinoid receptor (CBR) 1 or 2. SCs exert their psychotropic effects through CBR1 which is primarily located in the central nervous system (CNS). Mechanisms of pharmacological action of SCs in CNS involve overstimulation of CB1 receptor, disruption of GABA/ glutamate and endogenous cannabinoid system in the brain, re-uptake of CB1 receptor and activation of mitogen activated protein kinase shown in forebrain and hippocampal neurons [3].

Toxicity of SCs was shown on body, organ and cellular levels. For instance, cardiovascular effects of toxicity of SCs include: tachycardia, hypertension, hyperglycemia, hypokalemia. SCs also cause acute kidney injury [5].

Neurological effects are euphoria, drowsiness, paranoia, delusions, hallucinations, anxiety, panic attacks, agitation, nausea, vomiting, seizures and dizziness. Neurotoxicity can be manifested in cognitive defects and short-term memory loss and suicides [6].

SCs and their smoke products were shown to have greater affinity to CBR 1 than natural cannabinoids, as tetrahydrocannabinol (THC) in cannabis plant material makes them more potent psychoactive substances for CNS [7, 8].

Moreover, psychotropic effects of SCs can be furthermore potentiated by their high lipophilicity and ability to cross blood-brain barrier and cellular membranes [9].

Unlike the mechanism of pharmacological action of SCs, the mechanism of body, organ and cellular toxicity of SCs is not completely understood. Cellular toxicity of SCs includes damage to nuclear and mitochondrial DNA and cellular membranes; alteration of genetic expression and protein synthesis, activation of caspase 3, apoptosis and necrosis, inhibition of cellular respiration [10]. For instance, delta-9-tetrahydrocannabinol (THC) was shown to inhibit cellular consumption of O2 and ATP production by TU183 oral cancer cells and human sperm in medium and by isolated mitochondria from beef heart [11, 12].

In some reports, secondary metabolites of SCs were described as CBR1-independent, targeting integrity of cellular membranes, and as more toxic than their parent compounds, causing decrease in cell viability, inducing apoptosis and necrosis [13].

General mechanism of cellular toxicity of THC targeting mitochondrial respiratory chain was presented by Wolff et al, 2015. THC was found to inhibit the activities of complexes I, II, III in isolated rat brain mitochondria [14], although the method used in this study did not allow to differentiate between these complexes.

However, another similar research by Singh et al, 2015 determined that mitochondrial complex II/III was the most affected among other enzymes after the exposure to THC and related cannabinoids [15].

Potential targets of mitochondria-related toxicity of SCs can also be important mitochondrial enzymes involved in Krebs cycle, mitochondrial DNA replication, ATP translocator [16].

The mechanism of cell toxicity of SC, XLR-11, involving damage to mitochondria, leads to impairment of endocannabinoid regulation of

mitochondria, hyperpolarization of mitochondrial membrane, increase in ATP production and elevation of ATP intracellular concentrations, high activity of caspase-3 and chromatin condensation, leading to higher number of apoptotic cells [17].

This general mechanism of mitochondrial toxicity of synthetic cannabinoids and their secondary metabolites have also been integrated with concepts of hormesis and multi-target toxicity.

2. MATERIALS AND METHODS

THJ-018 PARENT COMPOUND AND ITS COMBUSTION PRODUCTS

THJ-018 with purity of 98.5% was purchased from Sigma Aldrich. The mixture of combustion products of THJ-018 in DMSO was obtained by burning THJ-018 in a house-built device. The presence and concentration of combustion products of THJ-018 was confirmed by GC/MS analysis.

CELL CULTURE

Cell culture in vitro was performed using human neuroblastoma cell line, SH-SY5Y, which was a gift from Prof. Dr. Tiago Outeiro, PhD (Institute of Molecular Medicine, Lisbon, Portugal).

The cells were cultured under standard conditions (37°C, 5 % CO2 in humidified atmosphere) in T25 cell culture flasks using DMEM supplemented with 10.0 % (v/v) BSA and 1.0 % Pen/Strep-Glutamine. SH-SY5Y cell line, which had been stored in liquid nitrogen, was recovered and used for the experiments after re-culturing from 3rd to the 11th passage.

The cells were passaged each time, when their confluence in the cell culture reached 70-80%. During cell passage, first, DMEM media was removed from T25 flask. Then, the cells were washed with 3.0 ml of DPBS. Next, DPBS was removed and the cells were detached with 1.0 ml of stock Triple Express solution, washed with 3.0

ml of DMEM, transferred into a 15-ml Falcon tube and centrifuged in the 15-ml Falcon tube at 1000 rotations per minute for 5 min.

Finally, the solution was decanted and the cell pellet was resuspended in 3.0 ml of DMEM. This solution was used for passaging, cell counting and seeding of 96-well plates for the conduction of MTT and TB assays.

TRYPAN BLUE (TB) ASSAY

Cell counting using TB was conducted according to Strober, W., 2001 with the following modifications [18]. 10.0 μL out of cell suspension of total volume of 3.0 ml were transferred into a well of a 96-well plate and thoroughly mixed with 40.0 μL of already prepared TB solution using 20 and 200-μL pipettes achieving 1:5 dilution of cell suspension. After that, 10.0 μL of this mixed solution was dispensed to fill-in a Neubauer chamber covered with a cover slip. This procedure was repeated twice to fill in both chambers.

Cells were counted at x40 magnification in three big squares (central, upper left and lower right) and total concentration of cells in the volume of the initial solution of 3.0 ml of DMEM, in which the cell pellet was resuspended, was determined according to the following formula: concentration of cells (cells/ml) = the average of the number of cells in three big quadrants * 5.0 (dilution factor) * 104.

Counted cells were examined under the light microscope (x40) and determined either as viable cells in case they had clear cytoplasm, or damaged and dead cells in case they had blue cytoplasm.

Finally, the percentage of viable cells was calculated according to the formula: % of viable cells = number of viable cells / total number of cells (viable and dead cells) / 100%.

3-(4,5-DIMETHYL-THYAZOL-2-YL)-2,5-DIPHENYLTETRAZOLIUM BROMIDE (MTT) ASSAY

MTT assay measures cellular respiration in terms of mitochondrial production of formazan crystals

from MTT reagent. The procedure was performed according to the protocol given by Meerloo et al. (2011) with several modifications [19].

THJ-018 solution in DMSO was prepared in concentrations of 5.0, 10.0, 25.0, 50.0, 75.0 and 100.0 µM with fixed 0.2% of DMSO in the final volume of 200.0 µL, which was added into each well of a 96-well plate.

Fresh MTT solution was prepared by dissolving stock MTT powder in DMEM at 0.5 mg/ml for each MTT test. Aluminum foil was used to protect MTT solution from light. 0.2% DMSO was used as negative control, whereas 1.0% TritonX-100 was used as positive control.

MTT tests were carried out in 6 replicates as follows. First, SH-SY5Y cells were seeded into a 96-well plate at the concentration of 4.5×10^4 cells/ml in DMEM in the volume of 200.0 µL per each well and cultivated for 24h. Then, DMEM was removed by inverting over a 96-well plate and pressing it against clean paper towel in sterile conditions inside the biosafety level 2 laminate hood. Next, 200.0 µL of solution containing the parent compound, THJ-018, was added at concentrations of 5.0, 10.0, 25.0, 50.0, 75.0 and 100.0 µM.

After 24h incubation with THJ-018, DMEM was removed as described above. The cells were washed with 100.0 µL of fresh DMEM per each well. After that 200.0 µL of MTT solution was added in each well.

After the 2,5h incubation with MTT solution, the 96-well plate was unloaded as described above but in non-sterile conditions. Formazan crystals were resuspended in 100.0% DMSO in the volume of 200.0 µL per each well. The solution was thoroughly mixed with 200.0 µL pipette, avoiding the production of bubbles which could interfere with absorbance reading and protected from light with aluminium foil.

Finally, after formazan crystals were completely dissolved in 200.0 µL of DMSO in each well, the plate was read at 595 nm using a Bio Rad 680 Microplate Reader. The results of MTT assay were given as percentage of the production of formazan in SH-SY5Y cells in cell culture in vitro if compared to the negative control values, fixed as 100.0%.

IN-SILICO DOCKING STUDY

Formulas and structures of secondary metabolites of THJ-018 were obtained from Diao et al, 2018: THJ-018 (M0) and THJ-018 pentanoic acid (M7) [20]. The PDB structural files of these molecules were generated using https://chemoinfo.ipmc.cnrs.fr/LEA3D/drawonline.html.

5xte.pbd structural file was used for in-silico docking study of H and P chains of human mitochondria complex III, and 2k4t model1 was used for in silico docking study of human VDAC-1 with THJ-018 and its secondary metabolite, THJ-018 pentanoic acid.

Mechanism of cytotoxicity of THJ-018 and its secondary metabolites and combustion products on mitochondria was studied by in-silico modeling of interactions between THJ-018 and its metabolite, THJ-018 pentanoic acid, and heme C 402, chain H, of respiratory complex III with the computer program Autodock Vina 4.2.5.1, and analyzed with Chimera 1.10.5 and Discovery Studio Visualizer 2020.

STATISTICAL ANALYSIS

The independent variables were the concentration of the parent compound of SC, THJ-018, the time of exposure of SH-SY5Y cells to THJ-018 in cell culture medium and the number of passages of SH-SY5Y cells prior to the start of the assay. The dependent variables were the viability of SH-SY5Y cell line in cell medium upon incubation with the parent compound, THJ018, and the number of SH-SY5Y cells in cell culture in vitro after the incubation. The independent variables were assessed separately in identical cell culture conditions using either MTT or TB assays.

Simple regression, 1-Way and multifactorial ANOVA, and multifactor correlation tests were conducted using STATGRAPHICS Centurion Program in order to assess differences in degree of effects of the independent variables on the dependent variables.

Basic manual factorial (k2) statistical analysis was employed to evaluate the influence of the independent variables on the dependent variables in order to select the most appropriate research design to minimize the effect of viability change of SH-SY5Y cell line due to multiple passages.

The results were evaluated on the case-to-case principle. The minimum of 3 repeats for each assay were performed. In each assay, 6 replicates for each concentration of the parent compound, THJ-018, were conducted.

3. RESULTS: MTT ASSAY

Four individual MTT assays, using SH-SY5Y cells from passages 3,5,7 and 9, were conducted to measure cytotoxic effects of the parent compound, SC, THJ-018, in the concentration range from 5.0 to 100.0 µM.

THJ-018 parent compound, exhibited a complex toxic effect on the viability (formazan production and number of cells) of SH-SY5Y cells after 24h exposure in cell culture in vitro (Figure 1). For instance, in the concentration range from 5.0 to 75.0 µM, the production of formazan in SH-SY5Y cells, first, rose to 124.0%±16.1% and,

then, dropped to nearly 81.0±11.8% at 100.0 µM. Conducted t-tests showed no statistically significant differences between negative control and other datasets, except for the datasets on formazan production at THJ-018 concentration of 75.0 and 100.0 µM, which were statistically significantly different from the negative control.

At THJ-018 concentration of 100.0 µM, production of formazan decreased from 100.0% to 81.0% ± 11.8% if compared to negative control. Strikingly different picture was observed after 24h exposure of SH-SY5Y cells to THJ-018 combustion products in cell culture in vitro (Figure 1). Formazan production in these cells steadily fell from 100.0% to 32,8±7,2% if compared to negative control. Thus, the combustion products of THJ-018 caused significant drop in the production of formazan in SH-SY5Y cells if compared to the effect of THJ-018 parent compound in the same concentration range. Conducted t-tests showed statistically significant differences between negative control and the datasets on formazan production at THJ-018 concentrations from 25.0 to 100.0 µM.

TRYPAN BLUE ASSAY

Four individual TB cell counting assays, using SH-SY5Y cells from 3,5,7 and 9th passages, were
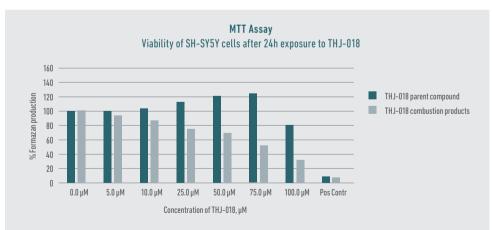

Figure 1. Results of MTT Assay, which measures the production of formazan crystals from MTT by cells through oxidation-reduction metabolism in mitochondria, are shown as a graph of concentration of THJ-018 in µM versus percentage of formazan production in % of negative control, which equals 0.0 µM. For each data set, experiment was repeated 5 times (N=5), chi-square tests were used to compare data, P value of less than 0.05 was considered to indicate statistical significance, and standard deviation was calculated from the mean value using Excel Program. All P values are two-tailed.
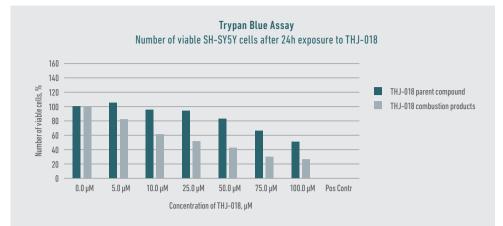
Figure 2. Results of trypan blue assay, which measures the percentage of viable cells versus dead cells by inclusion of Trypan blue dye, are shown as a graph of concentration of THJ-018 in μM versus percentage of formazan production in % of negative control, which equals 0.0 μM. For each data set, experiment was repeated 5 times (N=5), chi-square tests were used to compare data, P value of less than 0.05 was considered to indicate statistical significance, and standard deviation was calculated from the mean value using Excel Program. All P values are two-tailed.

performed to measure the number of cells per ml after 24h exposure to THJ-018 parent compound and the mixture of its combustion products in concentration range from 5.0 to 100.0 μM in cell culture in vitro. 0.2% DMSO was used as negative control and 1.0% TritonX-100 was used as positive control. Percentage of the number of cells was determined as percentage of the number of cells if compared to the negative control and measured with TB cell counting assay.

After 24h exposure to THJ-018 parent compound, there is a slight increase in the number of SH-SY5Y cells up to 126.0%±17.1% at 10.0 μM and statistically significant decrease to 49.5%±8.3% only at 100.0 μM. By contrast, after 24h exposure to THJ-018 combustion products, the number of SH-SY5Y cells significantly drops already at the concentrations above 10 μM (Figure 2).

Finally, formazan production and, hence, cellular respiration, peaks under concentrations from 25 to 75 μM of THJ-018 parent compound, while the number of SH-SY5Y cells reaches its maximum under lower concentrations of 5 and 10 μM (Figures 1 and 2). For example, at 0.0 μM of THJ-018 parent compound, the ratio (%/%) of formazan production to the number of cells is 1:1. At 10 μM, it becomes 1:1.2, whereas at 50 μM, it

flips to 1.2:1 and, finally, at 100 μM, it rises to 2:1, which indicates that at higher concentrations, SC, THJ-018 parent compound could overstimulate cellular respiration. In case of exposure to its combustion products, the over-stimulation effect of cellular respiration is smaller but occurs under all concentrations: at 10 and 100 μM, it is 1.3:1, while at 50 μM, it increases to 1.75:1 (Figures 1 and 2).

IN-SILICO DOCKING STUDY

Both THJ-018 and its pentanoic acid, showed several H-bond interactions with amino acids at Heme C 402 in chain H of human mitochondrial complex III (Figure 3).

It's to be noted that differences between binding sites of THJ-018 and its secondary metabolite, THJ-018 pentanoic acid with amino acids at Heme C in chain H of human mitochondrial complex III may provide clues to higher mitochondria toxicity of THJ-018 pentanoic acid. For example, in one of the steps of both rounds of Q-cycle, an electron is transferred from Fe2S2 center of chain P to Heme C of chain H (cytochrome c1) [21].

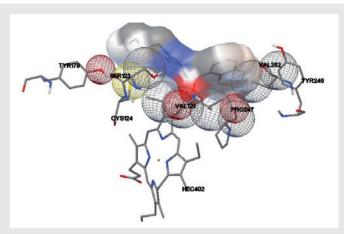This path of electron flow could be affected by binding of THJ-018 pentanoic acid in between

Figure 3. Results of in-silico docking study of THJ-018 with Heme C 402, chain H, of human mitochondrial complex III obtained and analyzed with Autodock Vina 4.2.5.1.
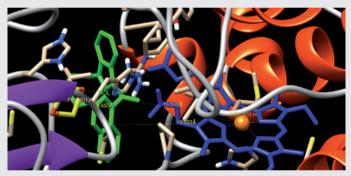

Figure 4. Binding site of THJ-018 pentanoic acid and its intermolecular distances between Fe of Heme C 402 (10 A), chain H, and Fe2S2 301, chain P (9 A), of human mitochondrial complex III analyzed with Chimera 1.10.5 (THJ-018 in green, Heme C in blue, Fe2S2 center in yellow and brown).

Fe2S2 center and Heme C *(Figure 4)*. Also, found direct Pi-alkyl interactions between Heme C and THJ-018 parent compound may also interfere with the functioning of Q-cycle *(Figure 5)*.

The results of MTT assay indicate that at concentrations from 50 to 100 μM, both THJ-018 and its pentanoic acid overstimulate cellular respiration, and inhibit it above 100.0 μM, which can be explained by their binding at Heme C 402 and Fe2S2 center, which, in turn, can withdraw electrons from Heme C through Pi-alkyl interactions and thus inhibit Q-cycle at concentrations of THJ-018 above 100.0 μM.

Finally, the results of our docking study have also confirmed previously published research
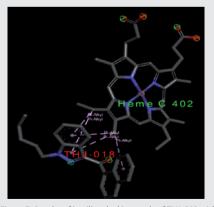

Figure 5. Results of in-silico docking study of THJ-018 with Heme C 402, chain H, of human mitochondrial complex III obtained with Autodock Vina 4.2.5.1 and analyzed with Discovery Studio Visualizer 2020.

data on cannabidiol interaction with VDAC-1, which makes this channel protein permeable to Ca2+. As it can be seen from *Figures 6 and 7*, THJ-018 and its secondary metabolite, pentanoic acid, can bind at the same time to N-terminal domain and interdomain part of VDAC-1, which form the walls of the intermembrane barrel of this channel protein and, thus, can inhibit the free-motion movements and possible interactions of N-terminal domain of VDAC-1 with other proteins.
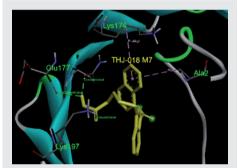

Figure 6. Binding site and interactions of THJ-018 M7 pentanoic acid (in yellow) with VDAC-1 amino acid residues (in green).

4. DISCUSSION

We report complex dynamics of viability of SH-SY5Y cells after 24h exposure to the parent compound, THJ-018 and its combustion products. For instance, the cytotoxic effects of THJ-018 parent compound revealed two-sided impact on the number of SH-SY5Y cells in culture, which can be described as stimulatory or beneficial at lower concentrations (from 5.0 to 50.0 µM) and toxic or inhibitory at higher (from 75.0 µM) concentrations. However, maximal formazan production was stimulated by THJ-018 parent compound at higher (from 50 to 100 µM) concentrations, while the number of SH-SY5Y cells was already below the control.

By contrast, in case of THJ-018 combustion products, the results of MTT and TB assay revealed similar curves of concentration-dependent decreases in formazan production and the number of SH-SY5Y cells.

One of the possible explanations for the complex toxic effects of THJ-018 parent compound on the number of SH-SY5Y cells could be the effect of hormesis on these cells at lower concentrations of THJ-018, resulting in stimulatory or beneficial effects instead of toxic or inhibitory effects, leading to increase in cell division. For example, the effect of hormesis of pesticides and drugs on biological systems, including animals, plants and cell cultures in vitro, was described by Calabrese and Baldwin, 2002 [22].

The concept of hormesis integrated with multi-target toxicity implies that upon exposure to low toxic concentrations below 30.0% of its LD50, that is at THJ-018 concentrations from 5.0 to 50.0 µM, majority of SH-SY5Y cells in culture adapt to these concentrations of THJ-018 due to a physiological overcompensation mechanism in mitochondria causing stimulatory effects on cellular viability, leading to observed increase in cell numbers. At higher THJ-018 concentrations (50.0-100.0 µM), less adapted SH-SY5Y cells undergo cannabinoid-induced apoptosis, where-as better adapted cells are overstimulated for mitochondrial respiration and ATP production until their complete inhibition above 100.0 µM [22, 23].

Less toxic effects of parent compounds of SCs, at concentrations from 5.0 to 50.0 µM, could also be explained by the general mechanism of toxicity of SCs proposed by Couceiro et al., 2016, according to which the parent compound is less toxic than its secondary metabolites and combustion products at equal concentrations, due to oxidative modifications in their molecular structures, which can make them more toxic [24, 25].

At present, there are several generally recognized cytotoxic mechanisms of action of cannabinoids and their secondary metabolites on mitochondria in different cell types. Although

CBR-1 was shown by a number of researchers [26, 27, 28] to be directly involved in mechanism of cannabinol toxicity of mitochondria, especially in neurons and muscle cells, it could still be largely more dependent on a particular cell type under investigation than general toxicity mechanism for all types of cells [29].

For instance, cannabinoid toxicity was shown by Silva et al, 2018 as independent of binding to CBR1 in HK-2, kidney cells, targeting, instead, the stability and polarization of mitochondria membrane by interfering with activation of CBR in endocannabinoid system and inducing Caspase-3 mediated apoptosis. Of note, cannabinoid-induced increase in cellular respiration and ATP production have also been found to occur as CBR-independent upon its observation in CBR-non-expressing HEK-293 cells [30].

CBR1-independent mechanism of cannabidiol toxicity was also reported to take place in mitochondrial membrane and act on voltage dependent anion channel 1 (VDAC-1), making it permeable to Ca2+, which, in turn, promotes depolarization of inner mitochondrial membrane, induction of mitochondrial permeability pore, Ca2+ overload, oxidative stress, Ca2+ release from ER into the cytoplasm and activation of Caspase-3 mediated apoptosis. [30, 31].

Our in-silico docking study showed similar binding sites for SC, THJ-018, and its pentanoic acid at N-terminus of human VDAC-1, including N-terminal domain, which acts in voltage-gating, control of channel shape and permeability, recruits anti-apoptotic proteins, such as HK1, BCL2 and BCL-XL to outer mitochondrial membrane and interacts with cytosolic proteins like actin and tubulin [32]. As the results of THJ-018 binding to N-terminal of VDAC-1, its functions can be affected, so that to make it constantly permeable to Ca2+ and to trigger apoptosis.

All this suggests that it can be a part of common mechanism of CBR-1 independent cannabinoid toxicity that makes this outer mitochondrial membrane channel protein, VDAC-1, a target for different cannabinoids in various types of cells.
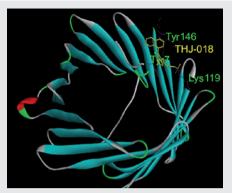

Figure 7. Binding site and interactions of THJ-018 (in yellow) with VDAC-1 amino acid residues (in green).

The notion of multi-target cannabinoid toxicity on mitochondria, including iron-sulfur center, Heme C in complex III and VADC-1 in different types of cells could also integrate seemingly contradictory data on concurrent cannabinoid overstimulation of mitochondrial respiration and ATP production with cannabinoid-caused damage to mitochondrial membrane, inhibition of complexes I, II and III and Caspase-3 mediated apoptosis by CBR-1 independent mechanism of toxicity.

5. CONCLUSION

Using in-vitro and in-silico assays, we show that parent compound, THJ-018, has complex cytotoxic effects on cellular viability of SH-SY5Ycell line in terms of formazan production and percentage of viable cells at concentrations up to 100.0 μM.

The obtained results were in a good accordance with the previous publications on cytotoxicity of parent compounds of synthetic cannabinoids, which state that because these parent compounds have not yet undergone secondary metabolism, they are less reactive and cause less damage to cellular membranes and mitochondria.

On the other hand, the results of our work also support the theory of hormesis, which explains

beneficial toxic effect of pesticides and drugs on biological systems, including animals, plants and cell cultures in vitro as adaptation to chronic stress at low toxicity concentration levels.

However, the results of TB cell counting assay of viable cells under chronic cell culture stress, such as sub-toxic concentration of THJ-018 (5.0-10.0 µM) in cell culture medium during 24h, should be met with caution as the actual cell number could be underestimated due to limitations of TB assay.

Finally, the concept of multi-target cannabinoid toxicity of mitochondria explains concurrent THJ-018 induction of cellular apoptosis and over-stimulation of mitochondrial respiration observed from 50.0-100.0 µM in our in-vitro study.

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GILTS AND SOWS REARED BY COMMERCIAL FARMS IN THE CENTRAL AND SOUTHERN LAOS: MANAGEMENT AND REPRODUCTIVE PERFORMANCE

Somsy Xayalath

Doctoral School of Animal Husbandry, University of Debrecen,
Institute of Animal Science, Biotechnology and Nature Conservation, Faculty of Agricultural and Food
Sciences and Environmental Management, University of Debrecen

József Rátky

University of Veterinary Medicine

ABSTRACT

Pig production in Laos is minimized, which does not compete with neighbouring producers such as Vietnam and Thailand. The study covered 10,083 sows and 110,240 piglets from 21 commercial pig farms in Central and Southern Laos to investigate the reproductive management, compare reproductive performance of sows in different commercial farms, and trends in commercial pig production. A semi-structured questionnaire was a key tool for correcting data, together with real farm observation. The results showed that all farms with over 100 sows (large farms) utilized artificial insemination (AI) in the breeding program. While all farms with less than 10 sows (small farms) applied only natural mating, a few farms with between 10 to 100 sows (medium farms) used both natural mating and AI technique.

KEYWORDS:

- GILTS
- REPRODUCTIVE MANAGEMENT
- REPRODUCTIVE PERFORMANCE
- COMMERCIAL PIG FARMS IN LAOS

Age at puberty, first mating/insemination, and first farrowing were not different (p > 0.05) among clustered farms, with averages of around 5.90, 7.29, and 11.12 months, respectively. Similarly, no significant difference (p > 0.05) was observed in the mean litter size, birth weight, and weaning weight (10.93 ± 2.50, 1.35 ± 0.37, and 7.26 ± 2.34 kg, respectively). However, the litter per year was significant (p < 0.05) between small and large farms (2.05 vs. 2.28 time/year), but no difference was observed when compared to the medium farm. There was also a significant difference in the suckling period (p < 0.05) between the clustered farms. It was longer in farms with < 10 sows (32 days) compared to farms with 10 to 100 sows (27 days) and farms with > 100 sows (23 days). Pre-weaning mortality did not differ (p > 0.05) among the clustered farms. Anyway, farms with < 10 sows had slightly high piglet mortality (12.91 %) compared to farms with 10–100 sows and over 100 sows (10.93 vs. 9.87 %). The sows in the small commercial farms had the longest (p < 0.05) mean weaning-to-estrous interval (16.50 days) compared to medium and large farms (6.13 vs. 7.64 days). Although, most sows' reproductive performance parameters did not differ (p > 0.05) among the clustered farms. But the gilts and pre-post-farrowing management are strongly different. Our results suggest that alongside the improvement of gilts and pre-post-farrowing management strategies, housing and nutrition for pigs need to be improved, especially for the small commercial farms, which mainly use the available local feed as feed for their pigs.

1. INTRODUCTION

The agriculture sector contributed around 16.51 % to the GDP of Laos (Lao Statistic Bureau, 2021). Livestock production is an essential component of the agricultural sector which have a significant contribution to people's livelihood and is considered an essential component of farmers' household income in remote areas, with about 50 % and 30 % in the lowland (Stur et al., 2002). With the intention of supporting the government's effort to improve the country's livestock industry, particularly the swine industry, the Food and Agriculture Organization (FAO) gave funds to the National Agriculture and Forestry Research Institute of Laos (NAFRI), which helped the importation of the first 120 European sows from Thailand in the 1980s. FAO continued to provide funds to establish 1,200 sows for the national pig research center to produce two cross-bred pigs (Large White x Duroc) to increase pig productivity in the country (Keonouchanh & Dengkhounxay, 2017). Still, nearly 91 % of the pig population in Laos is based on small-scale production and primarily focuses on indigenous pigs (Keonouchanh, 2018). As the Lao National Statistics Bureau (2021) record showed, in 2020, Laos had a pig population of about 4.3 million, and over 90 % of them were native pig breeds. However, pig production is considered the 3rd supplying meat for consumption in the country, and by 2020, the government of Laos set a target of 97,500 tons of pork production and 116,200 tons by 2025 to serve the National Food Security Strategies. In realizing this target, the government strongly introduces and promotes the switching from the old traditional production to the modern production system by increasing the sows by at least 45,000 heads by 2025 (MAF, 2015). In 2015, Laos had 23,200 sows. Therefore, achieving this target by 2025 is a great challenge to the Lao government (Inthavong, 2021). For the last two decades, the development of Lao swine industry has been inconsistent. Although the development of commercial pig farms was started in 2000, and the number of commercial farms rose

to 630 in 2014, it decreased to 578 farms in 2019. Similarly, the pig population reared in commercial farms decreased from 500,000 heads in 2014 to 360,000 heads in 2019 (Kunavongkrit and Heard, 2000; DLF, 2020). This triggered the need for Laos to import large quantities of pork from neighbouring countries.

Although, the production trend in the Lao swine industry has been recorded, unfortunately, Laos does not have a clear system for specific recording of pig growth and reproductive performance parameters, which are essential aspects in the rearing and production of pigs that can highly influence pig production in the country. Until now, it has not found much scientific research on exotic pig breeds (European types) in Laos. For these reasons, a study on the reproductive management and performance of gilts and sows in commercial pig farms was conducted as the first study in Laos.

2. MATERIALS AND METHODS

2.1 STUDY AREA

The study was conducted in Central and Southern Laos, where the number of pig-raising households was lower than in the Northern part of Laos, which has below 60 %, except Saravanh and Attapeu provinces, with between 60-80 % (Epprecht et al., 2018). However, most commercial pig farms are located in the Central and Southern provinces. The central provinces had the highest number, with 382 out of 578 farms in 2019. These two regions are lowland areas, particularly alongside the Mekong riverbank, where the main crop is produced, especially rice, cassava, and other cash crops, which serve as feed for pigs (MAF, 2020).

2.2 SAMPLING PROCEDURE AND SAMPLE SIZE

Six provinces (Vientiane Capital, Borikhamxay, Khammouan, Savannakhet, Saravanh, and Champasak) alongside the Mekong riverbank were selected for this study. There is a higher number of commercial pig farms located in these provinces

compared to other ones. In 2019, Vientiane Capital had the highest number of commercial pig farms (187 farms with about 212,000 heads), while Borikhamxay province had the lowest number of commercial pig farms (21 farms with about 14,000 heads) among the selected provinces. The sample selection was performed based on the decision of DAFO (District Agriculture and Forestry Office) to choose the proper farms and volunteers to respond to the questionnaires, either in personal or online interviews. Twenty-one farms were selected, ranging from the smallest farm with only 5 sows to the largest farm with over 4,000 sows.

2.3 METHODS OF DATA COLLECTION AND MEASUREMENT

Semi-structured questionnaires were the main tool to collect the primary data, coupled with individual interviews and online communication. The number of commercial pig farms and pig population for the last five years were analyzed based on the records from DLF (2020) and Yearbook from LSB (2014–2020). The trend of commercial farms and pig population in Laos between 2014–2019 was detailed *(Figure.1&2)*. For example, we aimed to evaluate the reproductive performance parameters, farm management, problems, and causes of piglet mortality. Therefore, farms were divided into three categories based on the number of sows on the farm. That is, small commercial farms "with less than 10 sows" (n=10); medium commercial farm "with between 10 to 100 sows" (n=4);

and large farms "with over 100 sows" (n=7). Any farm with at least 5 sows and two years of operation as a commercial farm was considered to qualify for the study.
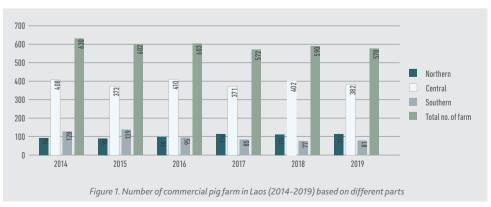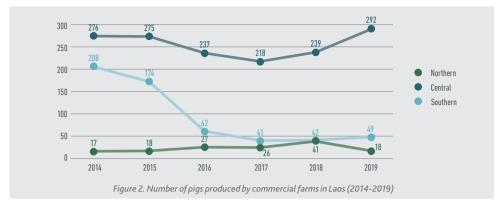
2.4 STATISTICAL ANALYSIS

Data collected were entered into Microsoft Excel version 19 and stored before analysis. The data were analyzed using MS Excel 2019, one-way ANOVA with 0.05 set as the significance level. LSD test of the SPSS statistic version 26 was used to check for the significant differences between the mean values of reproductive performance parameters; age at puberty, age at first mating, litter size, birth weight, suckling period, weaning weight, the mortality of piglets, the lifespan of sows and boars. Descriptive statistics (graphs, bar charts, and percentages) were used to present the pig population trends, differences in breeding management, gilt and sow management, farrowing management, and the causes of piglet mortality.

3. RESULTS AND DISCUSSION

3.1. THE GENERAL TREND OF THE COMMERCIAL PIG INDUSTRY IN LAOS (2014-2019)

Overall, the number of commercial pig farms in Laos slightly decreased between 2014 and 2019. The DLF (2020) records showed that commercial pig farms decreased by almost 8% within five years, from 630 farms in 2014 to 578 farms in 2019 *(Figure 1)*. The decrease was more than 37%

Figure 1. Number of commercial pig farm in Laos (2014-2019) based on different parts

Figure 2. Number of pigs produced by commercial farms in Laos (2014-2019)

in Southern and 7% in Central Laos. In contrast, there was an increase of 13% in Northern Laos. This was due to more new investments from Chinese companies in commercial pig farms in the Northern provinces (Xayalath et al., 2021).
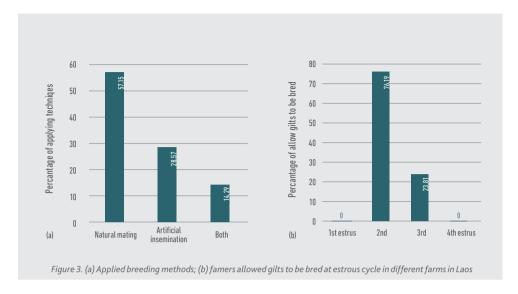
However, more contract farming was performed in the South and the Central parts of the country, using the 2 plus 3 approaches. Farmers respond to land and labour, while businesses respond to breeder and feed, technique, and marketing. The pig population produced by commercial farms was also consecutively decreased since 2014. Particularly in the South, which dropped by almost 92%, from 208,000 heads in 2014 to 18,000 in 2019 (*Figure 2*). In contrast, it increased by nearly 34% in the Central part, which went up from 218,000 heads in 2017 to 292,000 in 2019 (DLF, 2020). As a result of the small number of pig population produced by commercial farms in the country, Laos needs to import both live pigs and thousand tons of pork from neighbouring countries. For instance, in 2019, only Vientiane Capital imported 5,500 sows and more than 28 tons of pork products to meet consumer demand (VCPAFO, 2020).

3.2. GILT SELECTION AND GILT MANAGEMENT

Most farms select their breeding gilts at an average age of 5.7 months, ranging from 4 to 8 months. The smallest mean body weight (87 kg) of gilts at the time of selection in the farms with <10 sows significantly differ (p<0.05) compared to

the largest (116 kg) in the farms with >100 sows. Another interesting point to note is that most of the sows in medium and large farms are raised and farrowed in crates, while small farms are in open pens. In addition, the medium and large farms utilized the complete mixed feed from feed factories, which is different from most small farms that use locally available feed sources. The small pig farms did not have clear gilt selection and management criteria. Most of the farmers in the small farms select their breeding gilts from their farms, which is different from medium and large commercial farms that always import breeding gilts from the outside farm, mainly from Thailand. In this case, some medium and large commercial farms import their breeding gilts before 5 months of age to reduce the stress and ensure that the animals are familiar with the farm facilities before their first service.

Moreover, breeding gilts selection in small farms is mainly based on physical appearance. None of the participated farms made a selection based on the index. It was completely different from what Althouse (2015) indicated: breeding gilts should be selected based on indexes such as growth trait, disease status, sexual development, reproductive performance history, and body weight (113–125 kg) with the age of 5–6 months. The average age of the gilts at first mating was 7.28 months (218 days) which was slightly lower compared to the optimum period of gilts for their first service (230 days), with a bodyweight of around 136 kg

Figure 3. (a) Applied breeding methods; (b) famers allowed gilts to be bred at estrous cycle in different farms in Laos

(Knox et al., 2015). However, these findings were not different compared to Lao local pig breeds reared by small-scale farmers in Laos. The gilts always had their first service at about 6–7 months, making their first farrowing at about 10–11 months (NAFRI, 2018; Xayalath et al., 2021).

3.3. BREEDING MANAGEMENT

The natural mating (hand mating) technique is still the dominant technique that Lao producers apply in their pig breeding program. This is mostly practiced in the small and medium farms, which account for 57.15% of participating farms. All the large farms with over 100 sows utilized only AI, accounting for 28.57% of participating farms. Approximately 14.29% of the participating farms with 10 to 100 sows applied both hand mating and AI techniques *(Figure 3a)*. A majority (76.19%) of the farms allowed the gilts to be bred on their second estrous compared to the third estrous (23.81%). No single farm was found to allow their gilts to be bred at either 1st or 4th estrous cycle *(Figure 3b)*.
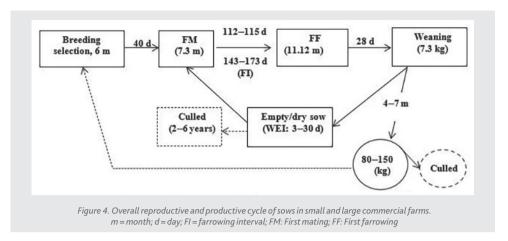
3.4. REPRODUCTION AND PRODUCTIVE CYCLE OF SOWS IN SMALL AND LARGE COMMERCIAL FARMS

Sows in commercial pig farms in Laos had their farrowing interval (FI) range from 143–173 days.

Gilts had their first mating when they were about 7.3 months of age, and the first farrowing was around 11.12 months of age (range from 10.88–11.33 months). The mean suckling period was around 28 days, ranging from 23-32 days. The mean weaning-to-estrus interval (WEI) was around 3-30 days *(Figure 4)*, depending on management, which was found quite longer in small farms compared to medium and larger farms.

3.5. REPRODUCTIVE PERFORMANCE OF SOWS IN COMMERCIALS PIG FARMS

There were no significant differences (p>0.05) in the age of puberty, age at first mating, age at first farrowing, and litter size of the sows in the small farm, medium farm, and large farm or with over 100 sows with an average of 5.90±1.00, 7.29±1.00, 11.12±1.00 months, and 10.93±2.50, respectively. However, there was a significant difference in litter per year (p<0.037), which was smaller in the farms with <10 sows (2.05), compared to the farms with 10 to 100 sows (2.25) and farms with over 100 sows (2.28). There was no significant difference in the mean birth weight and weaning weight (p>0.18 vs. 0.7) among the clustered farms, around 1.35±0.37 and 7.26±2.34 kg, respectively. Although, farms with <10 sows had a longer (p<0.001) lactation period (32.30 days),

Figure 4. Overall reproductive and productive cycle of sows in small and large commercial farms.
m = month; d = day; FI = farrowing interval; FM: First mating; FF: First farrowing

compared to farms with 10 to 100 sows (26.87 days) and farm >100 sows (23.00 days). The pre-weaning mortality was not significantly different (p>0.29) among clustered farms. Anyways, farms with <10 sows had the biggest pre-weaning mortality (12.91%), and farms with 10-100 sows had the smallest (10.96%), compared to 11.08% in the farms >100 sows. The longest mean (p<0.03) weaning-to-estrous interval was found in the farms with <10 sows (16.50 days, ranging from 6-30 days), compared to farms with 10 to 100 sows and farms >100 sows (6.13 vs. 7.64 days). There was no significant difference in the lifespan of sows and boars (p>0.98 vs. 0.88) among clustered farms, with an average of 3.73±1.30 and 3.52±0.89 years *(Table 1)*, respectively.

These findings were slightly different from Phengvilaysouk et al. (2017), who reported that sows managed on commercial farms in Northern Laos had a mean age at first mating (AFM) of about 7.8 months, the mean litter size of 10.5, pre-weaning mortality (PM) of about 9.5%, and lactation period of about 1.3 months with the weaning weight of 11.5 kg. There was a large difference when compared to the findings of Xayalath et al. (2021) indicated that the sows in the traditional extensive system in Northern Laos, had the mean AFM at 7.50±1.43 months, produced 7.60±1.76 piglets/litter, 15.45% in PM rate, 0.72±0.22 kg in birth weight (BW) and 7.29±2.12 kg in weaning weight (WW) with 2.62 months of the lactation period.

Table 1. Reproductive performance parameters of sows in small and large commercial farms in central and southern provinces of Laos

Parameter	< 10 sows (n=10)	10 to 100 sows (n=4)	> 100 sows (n=7)	p-value	Mean + SD
Age of puberty, month	6.05[a]	6.13[a]	5.57[a]	0.619	5.90 ± 1.00
Age at first AI/mating, month	7.05[a]	7.50[a]	7.50[a]	0.566	7.29 ± 1.00
Age at first farrowing, month	10.88[a]	10.33[a]	11.33[a]	0.566	11.12 ± 1.00
Litter size	10.45[a]	10.75[a]	11.73[a]	0.599	10.93 ± 2.50
Litter size per year	2.05[a]	2.25[ab]	2.28[bc]	0.074	2.16 ± 0.22
Birth weight, kg	1.22[a]	1.43[a]	1.49[a]	0.303	1.35 ± 0.37
Suckling period, day	32.30[a]	26.87[ab]	23.00[bc]	0.006	28.17 ± 6.46
Weaning weight, kg	7.50[a]	7.62[a]	6.71[a]	0.767	7.26 ± 2.34
Pre-weaning mortality, %	12.91[a]	10.93[a]	9.87[a]	0.944	11.24 ± 1.55
Stillbirth, head	0.71[a]	1.50[a]	1.16[a]	0.190	1.06 ± 0.79
Weaning-to-estrous interval, day	16.50[a]	6.13[bc]	7.64[bc]	0.011	11.57 ± 7.72
Lifespan of sow, year	3.90[a]	3.75[a]	3.50[a]	0.838	3.73 ± 1.30
Lifespan of boar, year	3.67[a]	3.67[a]	3.40[a]	0.221	3.52 ± 0.89

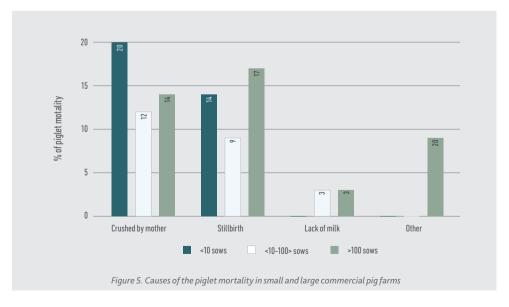[a,b,c]: mean with different superscript the same row is differ.

3.6. CAUSES OF PIGLET MORTALITY

There was no significant difference (p>0.05) in piglet mortality between the clustered farms. The mean of pre-weaning mortality is 11.24 ± 1.55%. The primary cause of piglet mortality was crushing by sows, which is the highest (46%), followed by stillbirth with 40% *(Figure 5)*. The mortality of piglets also happened because of poor management of farmers after farrowing. This was more in the small farms when the sows did not get a proper portion of the feed to support enough milk production for their piglets. One of the reasons might be that the small farms are household production and do not have properly skilled labourers to manage the sow and piglets during the farrowing. This might lead to higher piglet mortality due to poor stockmanship, as Webster (2011) described. The open pen farrowing in small-scale farms might not have the proper management. Therefore, the piglet mortality due to crushing by sows was slightly higher in small farms (20%), compared to 12% in medium and 14% in larger farms *(Figure 5)* where gilts and sows were always farrowed in the farrowing crate. This case might be one of the problems that led to the higher mortality of pre-weaning piglets (20–50%) in small farms in Laos

(Chittavong et al. 2012; Phengsavanh et al. 2011). Another interesting to note is stillborn, which was found slightly higher in farms with over 100 sows than in farms with less than l0 sows and between 10 to 100 sows (17%, 14%, and 9 %, respectively). We assumed that sows might spend prolonged birth intervals in the farrowing crate as opposed to free farrowing pens implemented in small and some medium farms. Anyway, it still needs to be proved by further scientific study.

3.7 NUTRITION AND MANAGEMENT

Local feed sources such as rice bran, cassava roots, wild taro, banana trunk, and other forest vegetations are still the main feed source for pig production on the small farms. It differs from medium and large commercial pig farms, which always use complete mixed feeds from the feed milling companies. As a result, most small-scale pig production in the study areas always own native pigs (Moo Lath) or hybrid (Moo Lath x European pig breed) with better adaption to the local feed sources and environment. From this point, we considered that it should be a great opportunity to do more promotion in local pig breeds for pig producers in Central and Southern Laos.

Figure 5. Causes of the piglet mortality in small and large commercial pig farms

On small farms, sows had a longer weaning-to-estrous interval compared to those in the medium and large farms. One of the reasons to respond for this difference might concern with the difference in feed components and feeding regime among farms. As described by (Jin et al., 2016), restricted feeding level during lactation, sows would lose live weight and take longer to return to oestrus after weaning. In this case, most of medium and large commercial farms used the complete mixed feed from factories, in which pigs are provided the proper nutrition. In contrast, in small farms, farmers use locally available feed sources to feed their pigs. This hypothesis supports the report of Phengsavath et al. (2010) who described that the small farmers in northern Laos fed their pigs, mainly with rice brand, broken rice, cassava, and other seasonal forest vegetations. Therefore, the gilts and sows in the small farms might not get enough nutrition to support their growth and reproductive performance. As the description of Jin et al. (2016) showed, nutritional status is seen as a critical problem that has a more significant impact on pig reproduction. The intake feed amount is always considered the fundamental component for maintaining physiological conditions and the reproductive performance of pigs, particularly gestating gilts. Energy diet influenced the bodyweight of sows during gestation and lactation. The gestating gilts fed with a diet containing 3,400 kcal of ME/kg of feed had a higher weaning number of piglets per sow than gestating gilts fed 3,100, 3,200, and 3,300 kcal/kg of feed. But the daily energy intake should not be less than 6,400 kcal/day to maintain optimum bodyweight and backfat thickness loss during lactation.

4. CONCLUSION

Natural mating is still dominant in all small commercial farms in Laos; some of the medium farms applied both natural mating and artificial insemination (AI), while all large farms applied only AI in their breeding programs. There was no significant difference in most reproductive performance parameters between clustered farms. However, there was a difference in litter per year, which was the smallest at small farms, combined with the longest suckling period as opposed to medium and large commercial farms. Higher pre-weaning piglet mortality was observed in small farms. This can be minimized by improving the nutrition and management or proper supervision at farrowing. Poor housing and feeding systems in small and medium farms should be the key to improve the quality of gilts and sows' productive and reproductive performance. Further studies should be done on improving the reproductive performance of Lao indigenous pigs to help increase their prolificacy and other traits.

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