



SZENT ISTVÁN UNIVERSITY, GÖDÖLLŐ
PhD School of Management and Business Administration

**CHALLENGES OF THE ECONOMY OF YEMEN AND
ITS POSSIBLE DIRECTIONS
FOR FUTURE DEVELOPMENT**

Theses of the doctoral (PhD) dissertation

Al-Sabai Abdulghani Ghalib

Gödöllő, 2020

Name of the doctoral school:

Doctoral School of Management and Business Administration

Branch of science:

Management and Business Administration

Head:

**Prof. Dr. H.c. Popp József DSc.
Professor, Academic, MTA doctor
Szent István University
Faculty of Economics and Social Sciences**

Supervisor:

**Dr. habil. György Iván Neszmélyi PhD
college professor
Budapest Business University
university private professor
Szent István University
Faculty of Economics and Social Sciences**

.....

approval of the head of the school

.....

approval of the supervisor

Table of contents

1. Introduction	4
1.1. Timeliness of the topic.....	5
1.2. The main objectives and the hypotheses set	6
2. Material and methods	8
3. The examination	9
4. New scientific results ant their utilisation	15
5. Conclusions and recommendations	18
6. List of references	19
7. List of publications on the topic of the dissertation	20

1. INTRODUCTION

Yemen's war makes all possible solutions impossible. Therefore, I make a proposal before the introduction for possible unfolding.

Yemen is not currently a functioning state. State functions do not work in the country. Therefore, the proposals formulated in the dissertation can be applied only after the domestic political situation in Yemen has stabilized.

Even before the current conflict, Yemen's development has faced a number of overlapping challenges. These included bureaucratic hurdles, poor infrastructure, significant under-training of the workforce, poor investment climate, lack of funding, excessive dependence of the economy on oil, corruption, state weakness, hiring elite and efforts to block reforms. By now, nearly four years after the civil war and regional military intervention, the functioning of the Yemeni economy and private sector has become impossible.

A negotiated settlement of the conflict will require rapid investment and private sector development to create jobs, rebuild infrastructure, end the financing of war, restore formal markets, and achieve overall socio-economic stability that contributes to lasting and long-term peace. Therefore, preparations need to start quickly, which will be possible after the weapons have been silenced.

As the UN Office for the Coordination of Humanitarian Affairs stated in December 2017:

“The agriculture sector has been severely constrained by a shortage of agricultural inputs such as vaccines, drugs, feeds and other essential commodities for the livestock, fishery and poultry sector. Poultry feed concentrate prices have risen by 70 percent since the crisis began. The high price of fuel has increased irrigation costs. Water prices have risen, forcing more farmers to give up their farms and exacerbate the loss of livelihoods.”

It is worth noting that agriculture and fisheries used to be sectors that provided employment for more than 54 percent of the rural population. The damage to these sectors affects the livelihoods of 1.7 million rural families.

Key findings and recommendations

- Yemen is unlikely to conclude full but partial peace agreements before reaching an integrated national solution. Reconstruction work must begin before the conflict is finally concluded and preparations must be made for the post-conflict period.
- Areas where reconstruction work can most easily and effectively begin must be identified, and work should be performed to encourage other regions to create the conditions for the efficient use of human and financial resources.
- The reunification of the Central Bank of Yemen should be a high priority in the efforts to achieve economic stability in order to re-establish a credible and efficient institution with sufficient capital for the stability of the national currency.
- A National Reconstruction Authority should be established that is composed of representatives of the main donors and neighbouring countries, international NGOs and the comprehensive Transitional Government of Yemen. This body will need close links

with local authorities in order to build trust and ensure that the priorities of the reconstruction process are met effectively, with a focus on small, cost-effective and rapid projects.

- The task of disarming and socially reintegrating the one million fighters must be solved immediately, and all militias and other forces must be treated equally in this regard. For those affected, job creation must be treated as an immediate priority in order to find a livelihood alternative. Relying on Yemen's still strong private sector and a vibrant diaspora community, the country's economic assets, such as fisheries, deep-sea ports and energy resources, need to be developed rapidly.
- Yemenians must decide for themselves the political future of Yemen - whether it emerges from the conflict as a unified state or as a new confederate state. General elections are an important part of this process, but this should not be rushed, and the organization should only start once proper preparations for civic participation and accountability have been made to ensure peaceful conduct. As a stable and prosperous Yemen benefits the wider region, the states of the neighbouring Gulf Cooperation Council should consider including Yemen in order to help achieve the long-term economic and social stability that the country needs if it withdraws from the conflict.

My dissertation is focused on the examination of Yemen and the presentation of its development possibilities. Yemen used to be a flourishing country of the Arab peninsula if we think of the country of Queen of Sheba or the period of the British Empire when Aden was operating as one of the most famous commercial ports of the region. Yemen, if properly adjusted, could be a centre for a major economic recovery due to its strategic position and history in trade.

Yemen is still vulnerable and endangered today as a great part of the population has to rely on humanitarian assistance as a result of the climate change, the economic and financial crisis, its dependence on oil and food, as well as political instability and the ongoing war.

Yemen is located in the southern part of the Arabian Peninsula, at the entrance to the Red Sea, with the north-western part facing the Red Sea and the eastern part the Arabian Sea. The two seas are connected by the Gulf of Aden and the Gulf of Aden, Bab el-Mandeb (*Tomolya, 2018*). Yemen is bordered by Oman and Saudi-Arabia. Two-thirds of the country is uninhabited desert. To the west of the narrow coastal strip, the mountain range stretches up to more than 3,000 metres high, and then the mountain begins to descend slowly to the vast expanse of the highlands. The Arabian Desert stretches from the north of the country to the coast of the Arabian Sea.

The current difficult situation in the big cities is worsening the state of the population. The country lies in the Middle East at the southern tip of the Arabian Peninsula. It also includes the island of Socotra in the Indian Ocean and the Kamaran archipelago in the Red Sea. The country covers an area of 527,968 km² and has a population of 29,100,000 in 2017. The capital is Sanaa.

The population is mainly Arab. The official language is Arabic, the religion is Islamic (mostly Sunni). The currency is the Yemeni Riyal. The country is surrounded by a narrow coastal plain from the Gulf of Aden and the Red Sea, followed by an inland highland that is mostly characteristic of the whole country. The north of the country stretches into the southern and southwestern Rub al-Khali desert.

Yemen has a multi-party republic, presided over by the head of state and the head of government as prime minister. Tribal ties remain strong and directly influence local and national politics.

The steady decline of its economic performance and the loss of Soviet political and economic support led, inter alia, to South Yemen's 1990 unification with North Yemen. In the united Yemen, however, omnipresent corruption hampers new economic growth.

In 1994, a new structure was approved after a two-month civil war. Many casualties of war are still in the region. Specific epidemics (e.g. cholera) decimate the population.

South Yemen is a province of the Arabic Peninsula with a promise of economic development. The climate is harsh, and part of the land can only be planted. As far as agriculture is concerned, the bulk of the grazing livestock farming, and fishing takes place here. At the same time, most industrial plants are located in Aden (South Yemen's former capital): food processing, small-scale production of cotton and leather products, and manufacturing of applied arts and aluminium products. The country produces and refines crude oil, too. Since the late 1980s, the resulting export sales have been a major boost for the economy but now oil reserves have been fully explored. Imported oil is also used for the production of petroleum products for sale. Many goods exported include coffee and processed fish. China, the United Arab Emirates, India and Switzerland are its major import partners, Yemeni GDP is also boosted by its citizens working abroad and significant foreign subsidies.

Agriculture employs approximately two-thirds of the workforce, but production is hampered by water scarcity, drought, low production areas and difficult terrain.

Timeliness of the topic

The timeliness of the topic is justified by my intention to provide some recommendations and a way out for the Yemeni population. As far as I know, no such comprehensive study has been published on Yemen in the previous decades.

In addition to the comprehensive presentation of Yemen's agricultural situation, in my dissertation I analyse its possibilities for development, its prospects, and the main directions of development, one of the most important of which is the further structural development of agriculture. The direction can be determined provided the prospects and problems of Yemeni agricultural production are known. The country is currently in great need of food imports, and it is critical that a growing proportion of its domestic needs are generated to ensure food self-sufficiency. The purpose of the study is to explore the multifunctional potential of agriculture with the logistical background to be developed, in particular with regard to employment, food self-sufficiency and expansion of exports. During the research, the Yemeni and international statistical databases provided the basis for the analyses.

The population of Yemen is dynamically growing so a lot of them can only be employed in agriculture. Forests and land suitable for agricultural production make up slightly more than 5 percent of the country while its 54 percent is desert. Pastureland is also significant, but no significant value can be produced here.

Most Yemenis live on agriculture and its production, producing large quantities of cereals, fruits, vegetables, khat (stimulating shrubs), coffee and cotton on relatively small areas of the region. They even keep sheep, goats, cattle, and camels. The growth of the agri-food industry is a crucial issue for the development of the country.

I enlist the resources of the country in my dissertation, and also evaluate the general situation. The biggest problem is water shortage and its future use. The population use the water in the soil

faster than it might be recycled. This is particularly evident in the Sanaa Basin where, instead of the previous 20 meters, groundwater can only be retrieved from 200 meters. Unauthorized drilling only exacerbates the problem.

By now, water has become more precious than oil. The wells of Sanaa may soon dry up so the dwellers might be forced to leave their homes.

For thousands of years, Yemenis have been forced to live with little water, but the problem has only been exacerbated by the widespread cultivation of khat (a long-consumed drug plant with leaves containing stimulants). Khat, which 70 percent of Yemeni men consume, takes up 40 percent of the water resources.

One of the most serious concerns for Yemen is the rapid increase in the unemployment rate. The 2011 revolution markedly aggravated the situation. Unemployment impacts one third of the population, and there is no possibility of a rapid recovery. Poverty and misery put Yemen in stunning contrast with the neighbouring Oman and Saudi Arabia.

LITERATURE REVIEW

Reviewing literature is important for the widest possible evaluation of the topic. There is a methodology for this that allows for a systematic review of the literature. Systematic review publications are high-level, comprehensive studies based on transparent, scientific methodologies and protocols, which include a critical evaluation and scientific synthesis of all available literature on a given topic through detailed, thorough research. Systematic literature reviews allow informed decisions to be made in the light of scientific evidence.

The number of publications has increased to such an extent that it is almost impossible to keep up with new research findings. Instead of textbooks, the publications published in scientific journals are the norm, and with the generalization of the Internet, studies of the order of thousands can be found on a given topic. Of course, not all of these can be used, but review studies can provide useful information.

The principles for creating these include

- search for all published and unpublished evidence,
- selection of studies according to methodological relevance,
- quality control of studies,
- the results must be communicated in an unbiased and objective manner,
- all steps in the preparation of the study are carried out according to a pre-defined protocol.

To improve the quality of systematic review reports, an international group of experienced authors has developed the PRISMA recommendation (Preferred Reporting Items for Systematic reviews and Meta-Analyzes). The document includes a 27-item checklist and a four-phase flowchart, the elements of which are required to produce a transparent, orderly literature review. The flowchart of the systematic literature review helps the systematic implementation of the literature review (Figure 1).

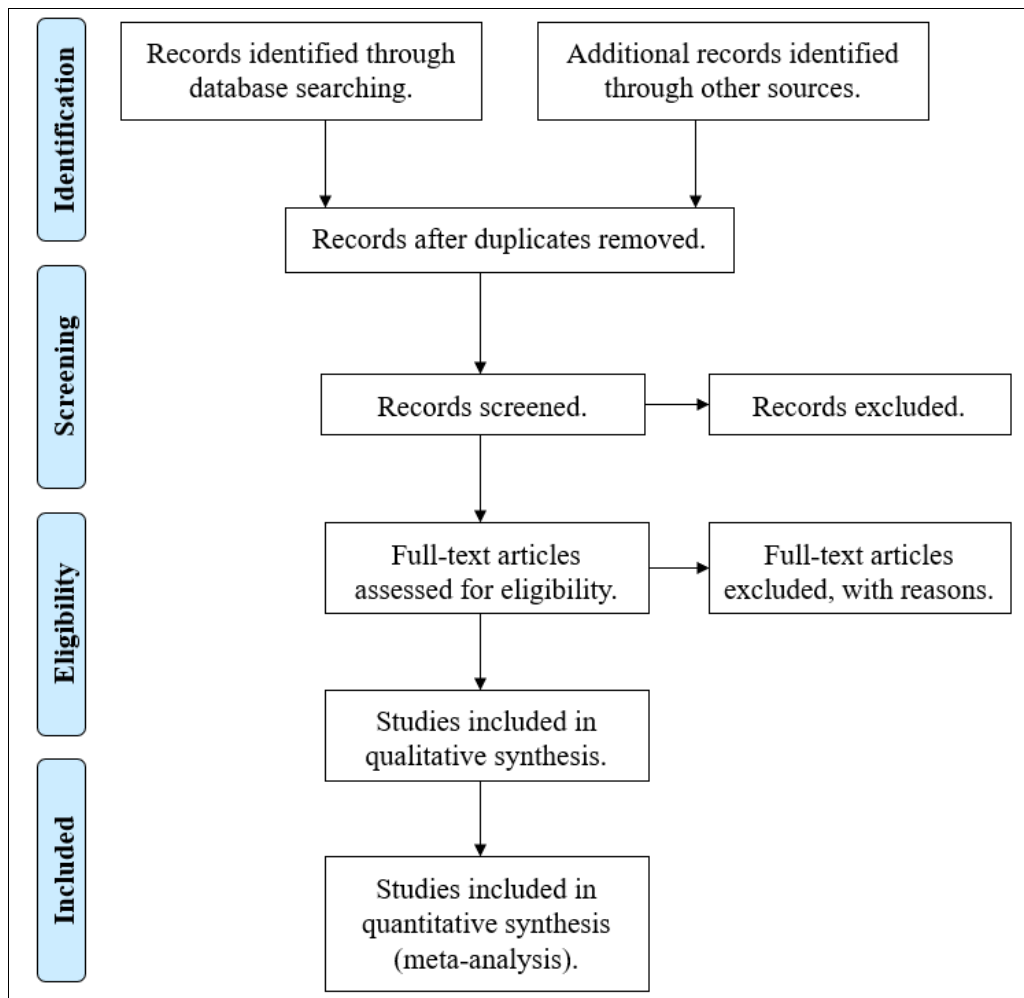


Figure 1 Flowchart of a systematic literature review based on the PRISMA recommendation
 Source: Kamarási - Mogyorósy, 2015. Following Liberati et al., 2009

During my review of the literature, I tried to work according to the steps of the flowchart. I filtered posts found in electronic databases and other places and used only posts related to the topic. The vast majority of literature review studies were selected on the basis of relevance. The studies selected for qualitative and quantitative evaluation were included in the dissertation based on their excellence.

By reviewing the related Hungarian and international literature, I collect and discuss significant Hungarian and international articles on the subjects of my dissertation to provide a theoretical framework for the key aspects in my field of research on the one hand, and to address the different views held by the experts in the topic on the other hand.

In accordance with the objectives, I aim to present secondary research results and draw conclusions that help to confirm or reject my hypotheses.

In presenting the literature, I analyse the main sources of the current difficulties of Yemen and compare the recent findings of the country with those of the Middle East and North Africa. The comparison is based upon the data of the World Economic Forum.

The main objectives of the dissertation

The doctoral dissertation is directed at analysing the possibilities of the current extremely negative situation and making recommendations. At the beginning, the main objectives are formulated.

The most recent secondary data and information available were used in the examination. Secondary sources are based on statistical data and the findings of international scientific research. The statistical data and analyses on Yemen, as well as international databases (e.g. *Agrárstatisztikai Évkönyv*, 2016; *Agriculture, Forestry, and Fishing-Yemen*, 2018; *FAO*, 2019; *CIA World Factbook Yemen*, 2019) are mostly based on estimates.

My key working hypothesis is that the environmental and social conditions in Yemen are sufficient for running a more developed, more productive agricultural sector. On this basis, the main research objective is to present Yemen's economic situation, with particular focus on agriculture, and outline potential development trends in the agricultural sector.

In my paper, I determine Yemen's food production potential by examining and comparing some of the parameters of Yemen, namely, population, total employment, employment in agriculture, and the proportion of the country's agricultural area suitable for farming with some relatively close countries based on CIA World Factbook data. In my view, a country's food production capacity depends, of course, not only on some of the factors studied, but also on a number of other factors, such as soil fertility, the standard of infrastructure for agricultural production, land use and land ownership. With these latter factors, a full comparison would be possible, but it would have gone beyond the scope of the paper.

Other objectives of the dissertation include defining economic opportunities and trends of key growth, evaluating and prioritizing activities to reduce unemployment. In doing so, I enlist the potential of resource usage and assess prospective areas based on trends and the criteria to be met in order to improve the situation.

My further objectives include carrying out an analysis of the direction of the country's economic activities and development opportunities and presenting contradicting opinions through a questionnaire survey. In pursuing my final objective, I strive to identify the directions and conditions for the development of the agri-food industry and tourism as these are the activities that generate the most employment.

An important part of my dissertation is hypothesis testing. Hypothesis testing is a statistical procedure that is suitable for deciding whether or not an assumption can be made true based on the collected data on the population. Hypotheses are assumptions related to the goals of the research work, which are formulated either on the basis of other research results or previous own results, or their proof is made using mathematical-statistical procedures. The hypotheses are closely related to the expected research result, the aim is to select the expected result, a suitable method for verification, and then to decide whether the hypotheses are true or false. Hypotheses and results should be closely related. I tried to validate these principles in formulating my hypotheses.

Using the findings and observations of the literature review, I drafted and tested the following research hypotheses in my dissertation.

Hypotheses:

- H₁** The current situation in Yemen is critical in almost all areas and the country's leadership needs to make rapid and effective changes in key areas (rising unemployment, water scarcity, development of agricultural and industrial production, etc.). Yemen's natural and social conditions are adequate to operate a more efficient agricultural sector than at present.
- H₂** The increase in food production is not keeping pace with the rapid population growth. The lag is evident in the country and neighbouring countries that are geographically and culturally similar to Yemen. The changes can be justified by trends. With proper organization and international assistance, food supply and export (coffee) can be achieved.
- H₃** The development of the livestock sector through the country's endowments (labour, grazing opportunities) can play a major role in reducing unemployment and managing the economic situation, in the quality production of cheese, wool, meat products, etc. It is desirable to provide international resources and loans for this, which is still the practice today.
- H₄** Infrastructure investments play an important role in reducing the country's high unemployment, for example in road construction, railway construction, the development of oil, natural gas and mineral extraction, and tourism. To this end, international resources can be provided, and development priorities can be set.
- H₅** Yemen has vast, exploitable resources: increased coffee production, solar energy, seawater desalination investments, fisheries development, a long coastline (2,500 km), and the commercial, cultural and tourist heritage of Aden and Sanaa, and so on. Reducing khat production can significantly increase food production.

Hypotheses are tested by the systematic evaluation of national and international literature findings as well as secondary research.

However, primary research supports the part of the hypotheses to which there is little reference in the literature. Based on a questionnaire, I summarize the opinion of Yemeni professionals residing in Hungary. Twenty percent of the respondents are people who live abroad or in Yemen. I assume I can offer methodologically sound preparation and conducting research correctly. I assume that by correctly preparing and conducting research, I can give methodologically sound answers to confirm or reject hypotheses. When compiling the questionnaire, the following logical correlations were taken into consideration.

- The gender, age, residence qualification and living standards of the respondents by asking demographical and personal questions.
- Questions are asked on the improvement possibilities of the agri-food industry. I assess what the agri-food industry can do to reduce unemployment.
- I examine what can be done to reach the correct ratio of khat and coffee.
- I will determine what key resources of Yemen are perceived by respondents.
- I assess what could endanger the sustainability of agri-food production and what impacts climate change can have on farm production.
- I sum up detailed economic development questions and answers.
- The role that tourism plays in Yemen is not indifferent. Questions are asked and answers are evaluated.

2. MATERIAL AND METHODS

By definition, the concept of scientific research is predetermined observation or regular experimentation, rather than occasional observation.

Majoros (2004) defines the essence of scientific research as follows: "*Scientific research is in fact a conscious, methodical cognitive practice that allows us to discover and map the world's novelties, thus providing people with the tools to help them deal with unusual problems and situations.*"

Szűcs (2008) explains that „It is clear from the above that some people consider only *basic research* to be research. That is, development of the analytical knowledge. Another definition is wider. Research includes so-called *disciplinary research* that synthesizes the development of knowledge, and *applied research*, which is the unity between the two (analytical and synthesizing problem solving).”

The success of the research is determined by systematicity, purposefulness and appropriate methodological approach. Tomcsányi (2000) gives a detailed description.

3.1. The research process

The scientific work can also be defined as research process whose objectives are as follows.

- Drafting new scientific problems;
- Solving the problems arising;
- Testing the hypotheses in connection with the problem;
- Making scientific research more effective.

Research in fact is a process and can be described as a flow chart (Figure 2).

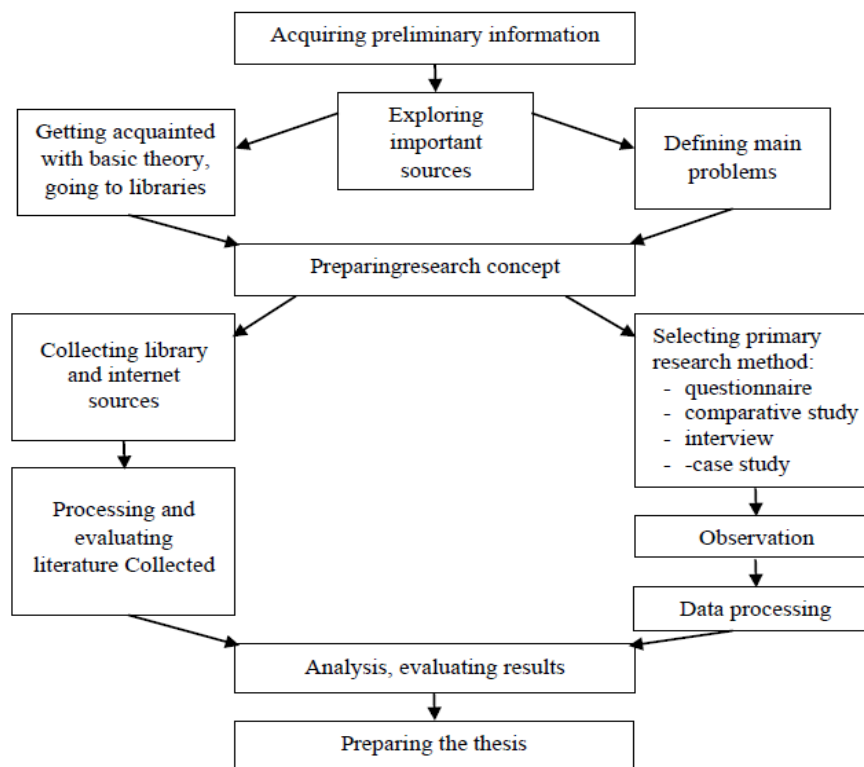


Figure 2 The research process
Source: Majoros, 2003

3. THE EXAMINATION

I examine the fields underpinning the future economic growth of Yemen in my own examination.

One of the most important areas is water, because in the future it will not be possible to carry out agricultural production and therefore employment without it. Unfortunately, water shortages are now becoming critical. Equally important is the exploitation of Yemen's natural resources. The Arabic Peninsula states are dependent on oil which has not yet been properly explored and extracted in Yemen. In my work, I analyse the weaknesses, strengths, opportunities and threats of Yemen on that basis. I identify a strategic future that will enable the economic development for Yemen. This is where solar panels can be used to address the problem of energy supply in Yemen.

An important part of my research is the analysis of the questionnaire carried out with Yemeni people living in Hungary and abroad. I am summarizing the responses showing how respondents view the possible development directions for Yemen. *Majoros's* work (2009) was used in my analysis.

3.1. The role of water resources in Yemen

Yemen utilises its agricultural areas in a versatile way, which is presented by Figure 3. Data derive from the 2013 document of the National Statistics Centre (Nemzeti Statisztika Központ).

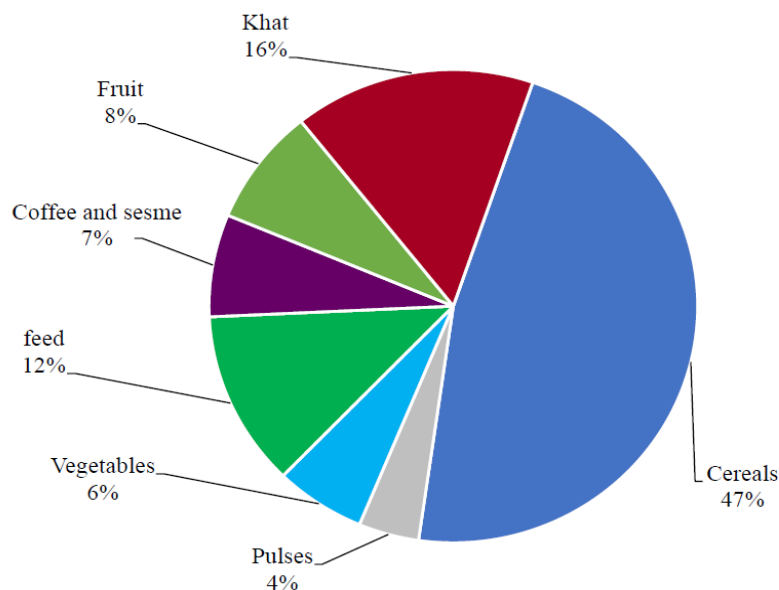


Figure 3 Amount of agricultural land in hectare, 2017.

Source: National Statistics Centre /Nemzeti Statisztika Központ/ - Yemen

I relied on data published by the National Statistics Centre in conducting my study (Yemen, 2017). The results were calculated using two statistical multivariate (cluster analysis and boxplot) methods. The research was assessable and proved to be a new information source. Agriculture means survival for most Yemenis, so the current and future water situation is very critical to them. Data were analysed by counties in relation to cultivated land area and water sources. The data available in the unit, wells, water source, dams and other water facilities, were examined in proportion to the hectare of the county.

I standardized the existing data per hectare in the first step of the study, and then, through cluster analysis I examined how the counties could mathematically grouped into groups. Standardization eliminated the order of differences in magnitude due to differences in the counties. I used the Customs Free Area Centre's official documentation (1993). The map is shown by Figure 4.



Figure 4 Areas of Yemen
Source: INTERNET

Based on the four criteria (wells, water springs, dams, other water establishments) the formation of three groups was justified.

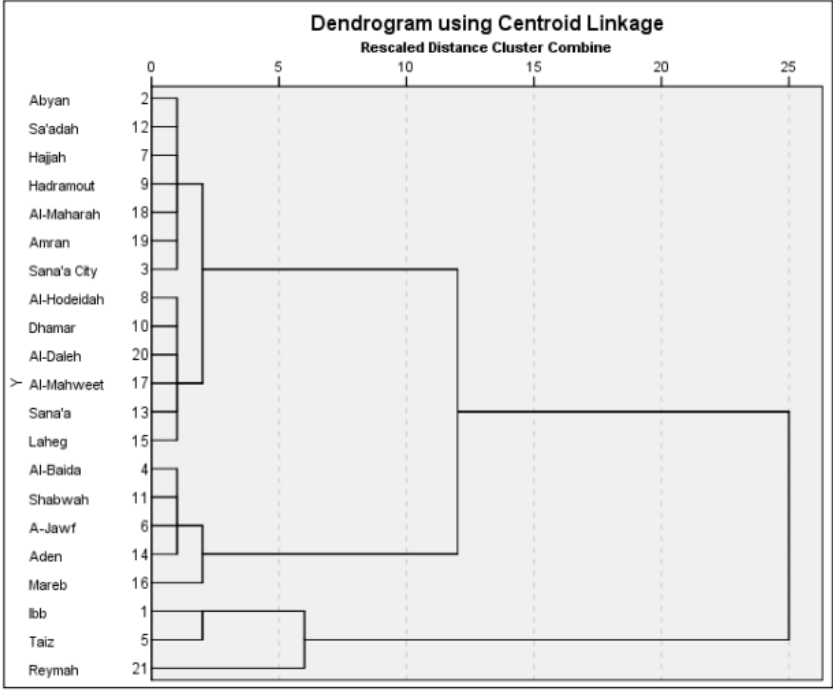


Figure 5 The formation of three groups
Source: author's own editing by SPSS, 2013.

The groups formed are presented by the following table.

Table 1 Group formation

	Group 1	Group 2	Group 3
1	Ibb	Abyan	Al-Baida
2	Taiz	Sama'a City	A-Jawf
3	Reymah	Hajjah	Shabwah
4		Al-Hodeidah	Aden
5		Hadramout	Mareb
6		Dhamar	
7		Sa'adah	
8		Sana'a	
9		Laheg	
10		Al-Mahweet	
11		Al-Maharah	
12		Amran	
13		Al-Daleh	

Source: author's own editing, 2013.

3.2. SWOT analysis

SWOT analysis was carried out to explore the current situation of Yemen, as well as define the possible ways for development. This method is a strategic planning method, which is important for internal perception and environmental change at national level. The first step is the conceptual analysis of the situation as soon as supporting each strategic concept is available. The strengths, weaknesses, opportunities and threats of Yemen are as follows.

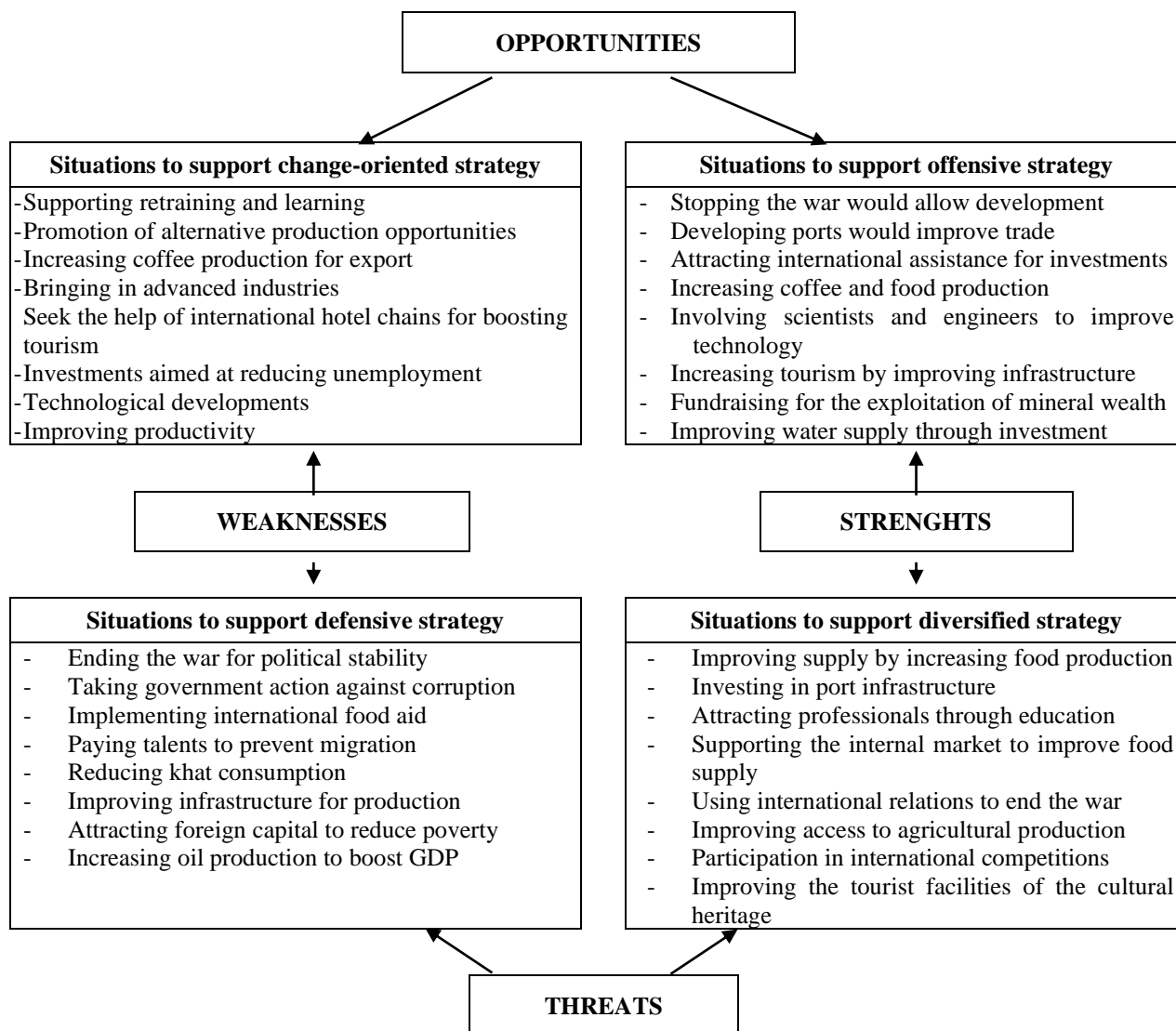
Table 2 SWOT analysis of Yemen

<u>Strengths</u>	<u>Weaknesses</u>
- Adequate health and elementary education;	- Political instability;
- Quality of education;	- Years of ongoing war;
- Taxation to encourage investment;	- Poor financing opportunities;
- Adequacy of local competition;	- Low competitiveness;
- Intensity of local competition;	- Corruption;
- A significant internal market;	- Inefficient government bureaucracy;
- Adequate investor protection;	- Insufficient innovation capacity;
- Adequate port infrastructure;	- Tax rules;
- Acceptable government debt to GDP;	- Unskilled labour;
- The impact of dangerous diseases is insignificant;	- Poverty in rural areas;
- Active commercial activity;	- Insufficient food supply;
- Low trade rates;	- Lack of state social security;
- Flexible wage setting;	- Excessive khat consumption;
- Worker-employer cooperation;	- Insufficient infrastructure;
- Acceptable and functioning banking system;	- The imprudence of government spending;
- Affordable financial services;	- Insufficient Internet access;
- Emerging marketing;	- Migration of talents;
- Availability of scientists and engineers	- Low productivity;
	- Weak technological background.

<u>Opportunities</u>	<u>Threats</u>
- Putting an end to the war;	- Continuing the war;
- Increasing the role of Aden and Sanaa;	- For external reasons, Yemeni production may decline further;
- Investment support for rich Arab states;	- Migration of active people is increasing;
- Involving international assistance to improve food supply;	- The role of ports is diminishing due to changes in the international situation;
- Achieving political stability through international relations;	- Yemen is unable to obtain international assistance to increase its water supply;
- Importing solar systems for power generation;	- There are no candidates for the exploitation of mineral resources;
- Yemen's population of 30 million could be a serious market for foreign traders;	- Rural poverty continues to increase due to war;
- Anti-corruption legislation;	- Yemen does not receive effective assistance in resolving food supplies;
- Increased use of port capacity;	- Due to the international situation, tourism opportunities are not exploited;
- Increasing coffee production to export sales instead of khat;	- Effective businesses cannot find their calculations, relocate from Yemen;
- Contacting international hotel chains to increase tourism;	- Poor production increases the number of people in need of external aid;
- Infrastructure investments involving foreign capital to reduce unemployment;	- The brain drain will worsen the situation in the country;
- Increasing university education at universities in foreign countries;	- Poor infrastructure does not allow to increase tourism;
- Improving the technological background by involving external resources;	- The relocation of advanced industries to the region is not due to the general situation in Yemen;
- Involvement of friendly Arab states in the exploitation of mineral resources (oil, gold, etc.);	- Yemen is unable to win international tenders due to insufficient resources;
- Investments to improve water supply with international assistance;	- The rural population is shrinking, and the population is moving to cities;
- To stimulate the economy through international loans, tenders for the development of agri-food industry.	- Food shortages are reduced due to water scarcity.

Source: author's own editing, 2019

Table 3 The strategic analysis of Yemen



Source: author's own editing, 2019

3.3. The statistical evaluation of the questionnaire

The questionnaire primarily assesses answers from Yemeni academics residing in Budapest. Respondents are smart people and their thoughts on the future opportunities for Yemen are important and useful.

The current research area applies to Yemen's food industry according to the following set of questions.

- What is hindering the growth of the agri-food sector?
- What can be done to improve agriculture?
- What is threatening the sustainability of agri-food production?
- What impacts could climate change have on Yemeni agricultural production?

As for gender, 26% of the respondents were female and 76% were men. In terms of age, 52 percent were below 40 and 44 percent between 41 and 60, respectively. The active age group

responded mostly to the questions. Regarding marital status 64 percent of them are married or live in cohabitation.

On the basis of qualification, 68% of them are college or university graduates, qualified and well-informed respondents. Most of them are employed in the public sector, either as a doctor or as a housewife. 80% of them report their standard of living as being average. Most of them have lived in Hungary for more than 10 years and some of them are foreigners.

The initial objective of the examination is to analyse the statistical nature of the opinions of respondents on how consistent they are with the answers to questions and the reasons for the differing views. Cluster analysis was used in the study.

Cluster analysis groups data objects based solely on the information found in the data that describe the objects, as well as the relationships between them. The object is to make objects similar (or related) to each other within one group, and different from (or unrelated to) objects in other groups. The greater the overlapping (or homogeneity) within the clusters, and the greater the difference between the clusters, the higher or more effective clustering is.

A hierarchical cluster analysis was performed of the variables within four groups. The variables clustered into each category are shown in the figure entitled "Breakdown of respondents". Cluster analysis distinguished the responses into four groups based on 33 criteria (Figure 6).

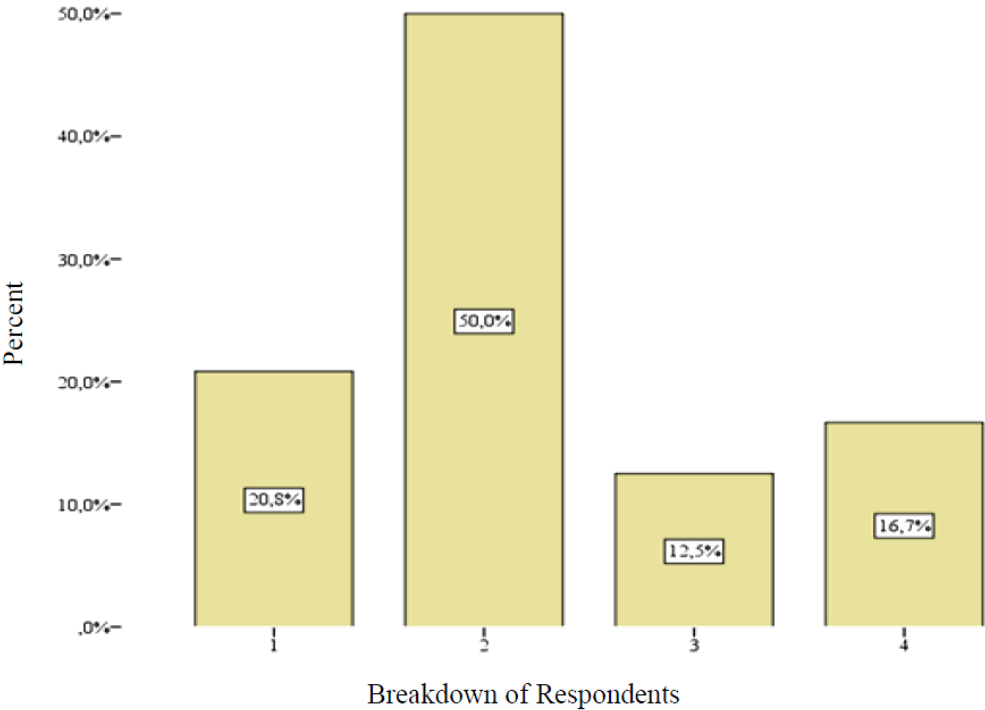


Figure 6 Breakdown of respondents in each group

Source: author’s own editing, 2019.

Comparison of agricultural production in Yemen and neighbouring states

Yemen’s neighbours are in different economic situations. There are countries that are rich in oil resources and there are poor people like Yemen. One thing can be said, food production is weak, and the situation is not bright for the future. For objective evaluation, I compare food production growth and population growth in Yemen and surrounding countries based on trends.

I think the increase in food production in several countries is not keeping pace with the population explosion. The countries neighbouring Yemen under study are illustrated in Figure 7.



Figure 7 Yemen and its neighbouring countries
Source: Google maps

Even without any special calculation, it can be seen that the wheat and corn produced in the country are not sufficient. Circus is consumed as food, of which 5 million tons are produced annually. The possibility of consuming basic foods from one's own fruit in the country is unsatisfactory.

The situation is not good in **Yemen**, either. The country’s population grew 6.39 times by 2020 compared to 1950 (Figure 8).

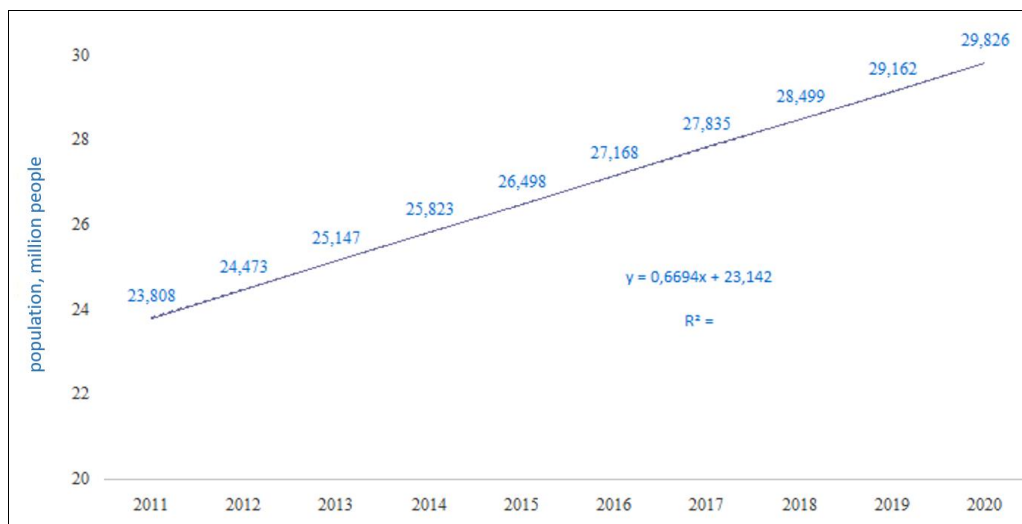


Figure 8 Population change and linear trend in Yemen
Source: Yemeni National Statistics Center, own calculation

The figure shows a high proportion of young people.

In Yemen, wheat and corn production is on a declining trend. This results in significant import food purchases being required. Sorghum production in 2019 was 200 thousand tons, very little. The trend is illustrated in the following figure (Figure 9).

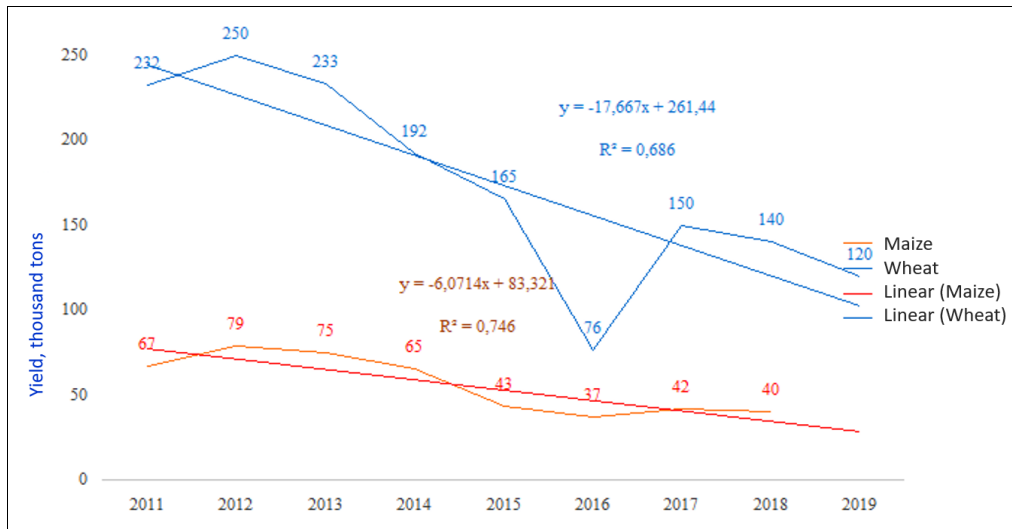


Figure 9 Experiential and linear trend of wheat and corn production in Yemen
 Source: author’s own editing based on United States Department of Agriculture

On the basis of the numbers, it is not surprising that Yemen needs humanitarian aid.

4. NEW SCIENTIFIC RESULTS AND THEIR UTILISATION

Literature review on the one hand and processing the questionnaire on the other hand have led to the new findings. The trends in population growth and food production in neighbouring countries also allow the presentation of new scientific results. My hypotheses were tested in my examination.

1. In my study, following the statistical analysis of the available data and the questionnaires, I came to the conclusion that it is beneficial for Yemen to improve its agricultural sector in the short and medium term, because reinforcing and enhancing food production potential is not only an economic but also a complex issue. It has consequences for civil and national security, too.
2. Modernizing and increasing agricultural production can reduce unemployment significantly, thus contributing to social stability. Today's unemployment is a serious concern because of the high number of young people, although young people without a vision are more likely to embrace extremist ideologies, which largely feed into current conflicts of tribal and religious origin. Another major problem is that, in addition to the urgent issue of unemployment, there is a significant shortage of qualified professionals. Developing agriculture, which is expanding gradually, can give meaning and a basis for life to the young generations, while improving the food supply of the country. Since food supply is unresolved in Yemen (and the surrounding countries), the increase in food production could not keep pace with population growth. Agriculture growth is unlikely to produce complete self-sufficiency but the extent to which domestic food production will be able to replace current (and future) food imports in the future is not indifferent at all.
3. The development of agriculture requires, in addition to human resources, modern cultivation technologies and other productive capacities, significant improvements in infrastructure, in particular transport and irrigation. Due to the scarcity of capital available domestically, development will also require substantial foreign direct investment, and the investors' confidence and the necessary internal macroeconomic environment cannot do without adequate public security, economic stability and legal certainty. The main obstacle is the limited availability of fresh water of the natural resources required for production. The solution to ensure adequate water supply will be water-saving technology, the construction of a modern desalination plant for seawater and the elimination of khat production, which is both harmful to the economy, the environment and human health. Solar systems will contribute to the energy needs of desalination plants.
4. For the comprehensive growth of the Yemeni economy, including agriculture, qualified professionals and modern technologies are critical. In this area, Yemen will have to make effective use of the opportunities offered in the future by the development programmes of donor countries, in addition to its own resources. Today's experiences of many productive developing countries show the value of prioritising education and technical development. Hungarian growth and educational collaboration projects have been introduced in previous decades already in this way. It is in the interest of Yemen that students should be sent to universities in foreign countries so it would be advisable to take advantage of the Stipendium Hungaricum programme. The creative work of the returning trained engineers and other professionals may improve productivity and technology by helping to tackle the dramatic professional shortage today.

5. The country's other features, which will also have a favourable future development potential, need to be developed in coordination with agriculture. The development of infrastructure (e.g. road network) also makes it possible to **develop tourism which can also be transformed into a major revenue-generating sector due to the unique cultural heritage and specific natural features of Yemen. The latter can be confirmed** by the long, yet largely untapped coastline of the region, as well as the entry or re-connection of the Aden port to international commerce. This latter purpose will also facilitate the export of agricultural crops and the country's mineral resources
6. Finally, as a new scientific result, I have presented Yemen's economic potential, development prospects, and comparisons with other similarly developed countries in English, and also by translating and synthesizing original Arabic literature, which, in my opinion is of its kind unique. As far as I know, there has been no scientific dissertation on the economic development of Yemen in Hungarian in recent decades, so my dissertation is also a niche bibliographic resource.

Utilisation of new scientific results

- The results and findings in the dissertation can be used well in economics and agricultural higher education, enriching the contents of international economics, international development policy, economic geography, world economics and other similar subjects.
- The results and conclusions of the paper may be helpful in designing a post-war economic development plan for Yemen and may act as a reference to the adoption or extension of the International Development Plan for Yemen for the Hungarian government and business professionals.
- Because of its comprehensive, structured information base including international comparisons, the dissertation may be useful as a source for further studies and research on economies related to Yemen, the Arabian Peninsula and the geographically close East African region, particularly given that, to my knowledge, few studies have been published in recent decades, particularly in Hungarian.

4.2. Testing the hypotheses

Table 4 Testing the hypotheses

	Hypotheses	Test
H ₁	The current situation in Yemen is critical in almost all areas and the country's leadership needs to make rapid and effective changes in key areas (rising unemployment, water scarcity, development of agricultural and industrial production, etc.). Yemen's natural and social conditions are adequate to operate a more efficient agricultural sector than at present.	confirmed
H ₂	The increase in food production is not keeping pace with the rapid population growth. The lag is evident in the country and neighbouring countries that are geographically and culturally similar to Yemen. The changes can be justified by trends. With proper organization and international assistance, food supply and export (coffee) can be achieved.	confirmed
H ₃	The development of the livestock sector through the country's endowments (labour, grazing opportunities) can play a major role in reducing unemployment and managing the economic situation, in the quality production of cheese, wool, meat products, etc. It is desirable to provide international resources and loans for this, which is still the practice today.	confirmed
H ₄	Infrastructure investments play an important role in reducing the country's high unemployment, for example in road construction, railway construction, the development of oil, natural gas and mineral extraction, and tourism. To this end, international resources can be provided, and development priorities can be set.	partially confirmed

H ₅	Infrastructure investments play an important role in reducing the country's high unemployment, for example in road construction, railway construction, the development of oil, natural gas and mineral extraction, and tourism. To this end, international resources can be provided, and development priorities can be set.	confirmed
----------------	--	-----------

Source: author's own editing, 2019

4.3. Main research areas to ground the hypotheses

- H₁ As confirmed by survey of the World Economic Forum, it is explained in detail in the literature review. In the questionnaire respondents regarded the growth of economic areas as significant.
- H₂ Analysing Yemen and the surrounding countries, statistical data trends reflect that population growth rates are higher than the growth rates in food production.
- H₃ According to the evaluation of the questionnaire, the development of extensive areas without sectoral changes and product processing can reduce unemployment.
- H₄ Investment in infrastructure is required and the development of infrastructure is necessary. There are currently few sources available to this end, therefore investment is likely to be ranked lower. Infrastructure investments can reduce unemployment. It may not be in the first position because of its high capital needs in the order but this growth is necessary. This hypothesis is confirmed by both secondary and primary sources.
- H₅ Yemen's resources are substantial, but their exploitation is slow and eventual. Both the literature sources and the questionnaire survey together with the SWOT analysis support this.

5. CONCLUSIONS AND RECOMMENDATIONS

My conclusions and recommendations are in line with the objectives laid out in the introduction. I analysed the situation in Yemen in detail in my literature review and identified the main ideas for reducing unemployment in the country.

Resource utilization can be facilitated by prioritizing areas for quick improvement and setting the directions.

The rapid development of Yemen is a priority in strategy. The main ideas include the following.

- Putting an end to the war would bring political stability and enable development.
- Corruption could be reduced by government action to enhance development.
- Developing ports would improve trade.
- Increasing the proportion of coffee and food production is essential.
- Khat production must be suppressed.
- Bringing oil production to an earlier level would be a source of development. This resource could help industrial development.
- Security is possible if foreign direct investment is provided.
- Tourism can be increased by improving the infrastructure. A significant cultural heritage can boost tourism.
- Learning and retraining can reduce skilled labour shortage.
- Improving water supply is essential. Long-term plans for this need to be implemented.

A considerable amount of literature was processed through my secondary research. My primary research is an analysis based on a questionnaire, that is the decisive part of my dissertation.

The key policy measures for improving the situation based on my secondary and primary analysis are as follows.

- The most important thing is to ensure the growth of the agri-food industry, which would yield the quickest returns. Only in agricultural production can a large community be employed, and that strategic path must be kept.
- Imports of food should be limited, and production of the basic food enhanced.
- The manufacturing of animal products also has rituals. This theory is, in my mind, feasible.
- A long-term strategy to reduce and address water scarcity must be worked out.
- Unemployment can be reduced by industrial development and infrastructure construction.
- Khat production must be reduced to the benefit of coffee and food production.
- Tourism development requires cooperation with international hotel chains so that this activity should be dynamic.
- The cities of Aden, Sanaa, etc. can play a key role in this activity.
- Developing technology requires the training of Yemeni engineers abroad.
- Poverty may be minimized as the economy boosts, and international food supply may also be required.
- Solar systems may improve power generation.
- Port developments could increase trade.

The respondents to the in-depth interviews were qualified professionals in the field. According to them, agricultural production is mainly threatened by the excessive increase of the khat area and water scarcity. Increasing coffee production is conceivable through a national programme, so significant export revenue is possible.

Tourism can be a major source of revenue for Yemen. Creating the conditions is yet to come. Tourism can gain ground on the beach and in cities. International resources are needed, there are examples of this.

To further analyse the economic situation in Yemen, I also wanted to conduct research that would not have fit into my dissertation, among other reasons. Gathering information was also hampered by the ongoing war. In the future, I would like to analyse the Cobb-Douglas nonlinear and Linear models, as well as the Linear programming models that can be used in land use analysis.

6. LIST OF REFERENCES

Agrárstatisztikai Évkönyv (2016): Jemeni Mezőgazdasági és Öntözési Minisztérium, <http://www.agricultureyemen.com/index.php>

CIA World Factbook Jemen, 2019. <https://www.cia.gov/library/publications/the-world-factbook/geos/ym.html>

FAO (2019): Yemen Emergency Livelihoods Response Plan 2019. FAO Rome Italy, 2019. 24. p. <http://www.fao.org/documents/card/en/c/CAEN>

Jemen Központi Statisztikai Hivatala évkönyve, 2016.

Jemeni Statisztikai Hivatal weboldala 2013 Accessed on 10 January 2014 <http://www.cso-yemen.org/>

Majoros P. (2004): A kutatómódszertan alapjai. Perfekt Gazdasági Tanácsadó, Oktató és Kiadó Rt. Budapest, 250. p.

Majoros P. (2009): A kutatómódszertan alapjai (harmadik kiad.) Panem Kiadó Budapest, 250. p.

Szűcs I. (szerk.) (2008): A tudományos megismerés rendszertana. Budapest, 272. p.

Tomcsányi P. (2000): Általános kutatómódszertan. Szent István Egyetem Gödöllő,

Tomolya J. (2018): Jemen Quo Vadis? Hadtudomány 2018. elektronikus lapszám, 1-10. p.

7. LIST OF PUBLICATIONS ON THE TOPIC OF THE DISSERTATION

Journal articles in Hungarian

1. **Al-Sabai, Abdulghani (2015):** Hogyan lehet életet adni a régi gazdasági funkcióknak? in: **Acta Carolus Robertus 5 (2)** pp. 9-18 (2015) ISSN 2062-8269.
http://uzletitudomanyok.uni-eszterhazy.hu/public/uploads/acta-carolus-robertus-5-2-_57e0ffba625e4.pdf
2. **Al-Sabai, Abdulghani (2016):** A munkanélküliség veszélye a jemeni gazdaság stabilizálására *Tér - Gazdaság – Ember*; a Széchenyi István Egyetem Kautz Gyula Gazdaságtudományi Kar lapja, IV. évfolyam 3. sz. 119-132 pp. ISSN 2064-1176
https://kgk.sze.hu/images/dokumentumok/folyoirat/TGE_IV_evf03.pdf
3. **Al-Sabai Abdulghani – Neszmélyi György Iván (2019):** A jemeni mezőgazdaság helyzete és jövőbeni kilátásai., *Gazdálkodás*. 63 évfolyam. 6. szám, 2019 (516-525).

Conference papers in Hungarian

1. **Kisari K – Al-Sabai Abdulghani (2014):** A khat és a víz kérdése Jemenben, in: XIV. Nemzetközi Tudományos Napok-Gyöngyös 2014 március 27-28. pp. 781-789. ISBN 978-963-9941-76-2.
http://publicatio.nyme.hu/350/1/XIV.NTN202014.03.27_28.printable_u.pdf
2. **Al-Sabai Abdulghani (2016):** A fenntartható fejlődés és Jemen veszélyeztetettsége, **In: XV. Nemzetközi Tudományos Napok-Gyöngyös 2016 március 30-31.** pp. 29-36. ISBN 978-963-9941-92-2.
<http://honlap.karolyrobert.hu/sites/honlap.foiskola.krf/files/media/upload/XV.NTN%202016.03.30-31.PRINTABLE.pdf>

Conference papers in English

1. **Al-Sabai Abdulghani (2016):** The Danger Caused By Unemployment In The Stabilization Process Of Yemen's Economy „13th Annual International Conference on Economics and Business, *Sapientia Erdélyi Magyar Tudományegyetem* 2016.10.20-22. ISBN: 978-973-53-1855-0; 1-27 pp.
http://www.szrtt.ro/attachments/article/41/conf_21_oct_section_proceedings.pdf
A teljes konferencia-proceedings pdf fájlban rendelkezésre áll, interneten már nem érhető el.
2. **Al-Sabai Abdulghani (2018):** Challenges of the agricultural economy in Yemen - The case of coffee and qat
Company Diagnostics, Controlling and Logistics 9 th International Scientific Conference. Žilinská univerzita, Žilina Slovakia, 2018; 10-20 pp. ISBN:9788055414645
Cd-ROM-on publikálták, interneten ingyenesen nem férhető hozzá

Abstracts

- Al-Sabai Abdulghani (2016):** A fenntartható fejlődés és Jemen veszélyeztetettsége, In: XV. Nemzetközi Tudományos Napok-Gyöngyös 2016 március 30-31, ISBN 978-963-9941-91-5; 49. p.
<http://honlap.karolyrobert.hu/sites/honlap.foiskola.krf/files/media/upload/XV%20NTN%20Abstractk%C3%B6tet.pdf>

Journal articles in English

1. **Al-Sabai Abdulghani (2018):** Coffee and qat fight for life in Yemen
Modern Science — Moderní věda. — Praha. — Česká republika, Nemoros. — 2018. —

- № 2. pp. 19-31. ISSN 2336-498X
<http://agentura.nemoros.cz/wp-content/uploads/2016/12/MS-2-2018.pdf>
2. **Al-Sabai Abdulghani – Neszmélyi György Iván (2019):** The importance of the agriculture in the renaissance of Yemen. *Selye E-Studies*, Komarno, Szlovákia -2019 - № 1. pp. 39-47. ISSN1338-1598.
 3. **Al-Sabai Abdulghani – Neszmélyi György Iván (2019):** The Challenges and actual questions of the agriculture in Yemen
Studia Mundi Economica, 1/2019; 116-124 pp. (2019 március)
 4. **Al-Sabai Abdulghani – Neszmélyi György Iván (2019):** The role and potential of Aden in the yemeni economy
Modern Science - Moderní věda, Prága, Csehország,
Nemoros. № 2. pp. 19-31. ISSN 2336-498X (*Várható megjelenés: 2019. június, befogadó nyilatkozat kiállítása folyamatban van.*)

Book chapters

1. **Al-Sabai Abdulghani – Neszmélyi György Iván (2018):** The Timely Issues of The Development of Yemeni Agriculture
in: Neszmélyi Gy. (2018): Regional integration and spatial processes in the world
Szent István Egyetemi Kiadó, Gödöllő, 81-93 pp. ISBN 978-963-269-801-4
2. **Al-Sabai Abdulghani (2019):** A víz kérdése Jemenben.
in: In: Garai-Fodor, Mónika; Szemere, Tibor Pál; Almádi, Bernadett (szerk.) Mindennapi üzlet: Tanulmánykötet, Vízkapu Kiadó Kft. Budapest, ISBN: 9786158098519, 98 p.; pp. 6-12.
3. **Al-Sabai Abdulghani (2018):** The danger caused by unemployment in the stabilization process of Yemen's economy
In: Almádi, Bernadett; Garai-Fodor, Mónika; Szemere, Tibor Pál; (szerk.): Business as usual: Comparative socio-economic studies. ISBN 978-615-80985-0-2, Vízkapu Kiadó Kft. Budapest, 2018. 127 p., 7-20 pp