The COVID-19 Epidemic as a Lever for the Renewal of Higher Education in the State of Israel

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The State of Israel is currently considered a "start-up nation" that stands out in the proportion of educated people with a tertiary education (which currently stands at 50.1% compared to OECD countries at 38.6%), which constitutes an essential and central growth engine in the entire Israeli economy. two years ago, on 12/03/2020, As a result of the COVID-19 epidemic, the higher education system moved to a state of online emergency teaching in which educational and organizational processes were accelerated.

The purpose of this research is to discuss how the higher education system in Israel is dealing with the systemic changes that have been made over the past three years While referring to the role of the institutions to equip the graduates with the skills and characteristics necessary to strengthen the status of Israel's "start-up nation".

Keywords: HE scenarios, education, start-up nation

INTRODUCTION

This research discusses the question of how Israel's higher education institutions can strengthen Israel's startup nation status in the post-corona era. The article consists of three main parts: First part – is theoretical background in which we will present the scenarios for higher education following the epidemic, then we will examine the consequences of the epidemic on the nature and demands of students in Israel, and finally, we will examine Israel's status as a start-up nation. Second part- the findings of a qualitative pilot study will be presented that examined the perceptions of high-tech managers regarding the suitability of higher education graduates to the needs of the Israeli high-tech labor market. And in the Third part - we will discuss the findings, conclusions, and recommendations for further research.

LITERATURE REVIEW

Post-Corona Higher Education Scenarios

The outbreak of the Corona epidemic occurred in the city of Wuhan on November 17, 2019. and began to spread all over the world in mid-February 2020. In response to the epidemic, the countries-imposed movement restrictions through social distancing and the closing of non-essential public institutions. The

impact on higher education institutions was immediate. Most institutions were closed to face-to-face learning almost all over the world, When the institutions try to adapt to the new situation through the development of platforms for distance learning, independent online learning, and the provision of learning and teaching services with the help of digital means. Along with dealing with virtual learning, the institutions also faced financial problems related to the registration of new students, cash flow for ongoing operations, and the required investment in infrastructure, support, and training of teaching staff for distance learning [1].

Scenarios for higher education in the post-corona era Dozens of scenarios have been published to describe the trends of higher education in the future by international bodies and organizations such as the OECD [2] Higher education institutions [3], UNESCO [4], Research institutes [5, 6] and universities around the world [7], Among them, six studies were conducted in 2020-2021 (during the COVID-19 epidemic) which we will review here later.

TABLE 1
SCENARIOS FOR HIGHER EDUCATION IN THE POST-CORONA ERA 2020-2021

The Year of the research	The name of the research	Authors	Scenarios
2021	Exploring Digital Transformation in Higher Education and Research via Scenarios	Barzman, M., Gerphagnon, M., Aubin-Houzelstein, G., Baron, G. L., Benard, A., Bouchet, F., & Mora, O. (2021). Exploring digital transformation in higher education and research via scenarios. Journal of Futures Studies, 25(3), 65-78.	Scenario 1: HER in the shadow of the digital giants Scenario 2: HER and digital tech for the planet Scenario 3: Digital Territories-based HER ecosystems Scenario 4: HER faces digital frugality
2020	Transformation or evolution - Education 4.0 - Teaching and learning in the digital age	Bonfield, C. A., Salter, M., Longmuir, A., Benson, M., & Adachi, C. (2020). Transformation or evolution? Education 4.0, teaching and learning in the digital age. Higher Education Pedagogies, 5(1), 223-246.	Scenario 5: Scenario one: smart campuses Scenario 6: Scenario two: digital assistants Scenario 7: Scenario three: online learning and MOOCs Scenario 8: Scenario four: lifelong learning
2020	Education in an uncertain future: two scenarios	White, J. (2020). Education in an uncertain future: Two scenarios. London Review of Education.	Scenario 9: Economic and social status quo driven by capitalism; a society based on equal opportunities Scenario 10: A society based on democratic equality (equal respect) that promotes the well-being of the individual

The Year of the research	The name of the research	Authors	Scenarios
2020	The low-density university: 15 scenarios for higher education	Maloney, E. J., & Kim, J. (2020). The low-density university: 15 scenarios for higher education. JHU Press.	Scenario 11: Back to normal Scenario 12: Late start Scenario 13: Moving Fall to spring Scenario 14: First-year Intensive Scenario 15: Graduate students only Scenario 16: structured gap year Scenario 17: Targeted curriculum Scenario 18: Split curriculum Scenario 19: Block plan Scenario 20: Modularity Scenario 21: Students in Residence Learning Virtually Scenario 22: Low residency Scenario 23: HyFlex Scenario 24: Modified Tutorial Scenario 25: Fully Remote
2020	Higher education remade by COVID -19 Scenarios for resilient leaders - Deloitte	Clark C., Friedman S., Ludgate A., Cluver M., Fritz P., Evelyn Galletti E., (2020).,	Scenario 26: The passing storm Scenario 27: Good Company Scenario 28: Sunrise in the east Scenario 29: Lone wolves
2020	Four Models of Higher Education in 2030	Orr, D., Luebcke, M., Schmidt, J. P., Ebner, M., Wannemacher, K., Ebner, M., & Dohmen, D. (2020). Four Models of Higher Education in 2030. In Higher Education Landscape 2030 (pp. 25-42). Springer, Cham.	Scenario 30: Tamagotchi model Scenario 31: Jenga model Scenario 32: Lego model Scenario 33: The transformer models

The main trends in higher education occur in the context of five dominant historical processes: the expansion of Internet use; Drastic changes in the labor market, extending life expectancy; Climate change [8]; and the needs of the fourth industrial revolution [9].

The six studies reviewed present a framework of 33 scenarios that point to 3 major trends:

A. Digitization of the field of education - integration of technology in all learning processes, The teaching, and operation of the institutions
B. Participation of corporations and employers (strengthening alliances at the regional, national, and international levels)
C. Lifelong learning and On Demand.

The Main Trends

Digitization of Education

A study that dealt with education implications in "Industry 4.0"[1] examined the significance of the needs of the fourth industrial revolution [9]. The concept of education 4.0 means education intended for the

training of graduates for the new world and the imparting of technical skills such as digital information, use of big data, Communication, sharing, and resource management.

The main trends as a result of the fourth revolution point to learning anywhere and anytime (by digital means), Personalization of learning, choosing personal learning paths, experiential learning, project-based learning, learning from the analysis of big data and assessment methods based on the recognition of professional knowledge accumulated in several institutions and experiences.

1. The policy of a smart campus - The use of advanced digital technology in the campus environment is designed to provide an interactive learning experience adapted to the student's needs. In this approach, the smart campus is managed through big data systems, virtual reality, and the Internet of Things and involves implementing complex systems.
2. Digital assistants – Integration of digital assistants both in the learning system and in the system related to the daily operation of the student (The digital assistant will provide services such as: Answering questions, messages, scheduling, assignments, reading lists, the concentration of grades, questionnaires, test preparation materials, etc.) as well as providing an answer to the student's psychological condition through assistance to reduce stress, Anxiety, and improvement of the student's mental state.
3. Online learning and massively multiplayer online courses (MOOCs) – The transition to online learning began with the Corona crisis and is here to stay. Online learning allows institutions to increase the number of students, share innovative research with a wide and international audience and enable access to learning from anywhere and at any time. The institutions are currently faced with the ambition to provide quality learning, maintain the status of the teaching staff, Plan courses and develop methods that will provide thinking frameworks. Alongside the practical aspect of the online courses arise issues related to user support, digital assets, copyright, and digital accessibility. Also, research [11] examines strategies for universities to deal with the "new normal" situation following the corona epidemic and offers a scenario of "fully remote" - where all learning takes place online courses. With this approach, the main effort of the institutions will be in adopting pedagogical strategies in the development of online courses and programs.
4. Innovative learning spaces - study "Horizon for Higher Education 2030" - Higher Education Landscape 2030- AHEAD – [12] analyzes trends in the economy and the labor market, in didactics and scientific discussions on new learning theories for the development of future scenarios for higher education in Germany, Indicates in the Tamagotchi model - that the university is the central learning space that provides learning experiences in innovative learning spaces such as makerspaces and fab-labs (fabrication laboratory). In addition, the physical learning environment is expanding through global communication networks and augmented reality techniques.

Cooperation of Corporations and Employers (at a Regional, National and International Level)

1. In all future scenarios there is a reference to the impact of technology on learning and teaching methods. The "Foresight to the Horizon of 2040" study examined how digital changes affect higher education [13] in aspects of research, learning, Knowledge sharing, and an environment that operates in a digital economy. One of the main processes deals with the impact of the capabilities of giant digital companies on research and education. Having an advantage in the fields of digital innovation and artificial intelligence, these companies invest resources (budgets and knowledge) in higher education institutions but also set the research agenda. Under this influence, teaching is evaluated through a digital rating of lecturers and digital systems lead all stages of learning from teacher training to the completion of courses and study tracks.
2. Another trend is the organization of the higher education system to respond to local needs, In the context of territories promoting regional development policies. In this scenario, Higher education plays a significant role in creating cooperation with local communities to promote research and

innovation. Digital infrastructures produce huge amounts of information that are available, among other things, for local needs [13].

3. Deloitte Company [14] Examined scenarios regarding the effect of the Corona crisis on higher education, one of them - Good Company claims that employers invest in funding the tuition fees of their employees, and are therefore also involved in the skills being taught. In addition, there is a trend where corporations purchase education providers as private training assets for them.

Lifelong Learning

1. A prominent trend in all scenarios is lifelong learning. An example of a long-term project can be found in Singapore, where a project designed to professionalize the Singaporean labor market is being launched. As part of the project, a system was established that provides access to a variety of courses (Most of them are publicly funded) related to education compatible with the fourth industrial revolution. The variety of courses allows for online learning, short or long-term courses. It is not yet possible to gauge the degree of success, but there seems to be potential in this approach that allows citizens to improve their skills, provide them with an internship, and even allows them to switch paths to an entirely new career. [9]

2. The trend of "slow education" [15] is related both to lifelong learning processes and to the trend of longevity. In this scenario [8] the guiding line in the curricula will be to equip the students with knowledge and skills in an environment that allows the development of areas of interest without the pressure of matriculation exams or studies in degree courses that are accepted today. The institutions will invest in digital innovations, use online courses, the "flipped classroom" method, and digital degrees. In a world where the population will invest fewer working hours, these institutions will provide a framework for personal empowerment from youth to 100.

3. The premise of the Ganja model [12] is that the period of study in the traditional track at the university should establish the knowledge of the students so that the learners expand their knowledge according to their professional track. That is, the learning opportunities, improving skills, and acquiring new skills occur during the personal development phase of each learner (when he has already been absorbed into the labor market). at this point, Students choose the courses and learning areas (usually in short blocks). These courses are delivered by various training providers. This model responds to the needs of students and the needs of the labor market. In this track, the students do not abandon the traditional study structure, rather, learning is carried out throughout life by the skills and abilities that the individual needs to advance in the professional work path he has chosen. The transformer model [12] also deals with learners who return to higher education to acquire new basic knowledge after they have already been in the labor market for a certain period. (As opposed to the traditional model in which higher education studies take place immediately after high school). In this model, the students are motivated by the need to change careers, adapt their skills to the changing labor market, or change professional careers. The didactic concept of the model supports the idea of learning and personal development. The main engine in this model is the changes in the labor market that require the learner to expand the scope of skills, abilities, and knowledge.

TABLE 2
SUMMARY OF THE MAIN TRENDS FOR THE FUTURE OF HIGHER EDUCATION

Digitization of education	Cooperation between corporations and employers	Lifelong learning
Smart Campus	Digital giants	Lifelong learning
Digital assistants	Local and regional cooperation	"Slow Education"
Online learning	Purchase of education supplies	Completion of skills and qualifications
Innovative learning spaces		Courses adapted to the changing labor market

The Consequences of the Covid-19 Epidemic on the Characteristics of Learning in Israel

The discourse regarding ways to promote digital learning as a tool to improve teaching, and the learning experience for the lecturer's pedagogical abilities has taken a central place in recent years in the various academic institutions around the world in general and the State of Israel in particular. articles, projects, many training courses, and programs were studied to upgrade the existing teaching methods and combine them with innovative learning skills which are a necessary condition for the learner during his professional training process in the 21st century.

The Knesset Research and Information Center [16], There was already a discussion in 2013 regarding online learning, from which the first national digital program was derived, which was released in its first steps and in which main core areas were defined, among them education, Under the responsibility of the "Ministry of Social Equality" in the State of Israel, to develop educational innovation and improve the system of professional training in the economy in such a way as to ensure the raising of the professional level of the Israeli workforce and its global comparison to other developed countries [17]. As part of this discussion, the various challenges facing the higher education system in the teaching of multi-participant open online courses were presented, including 1) The fear of reducing the "market value" of the academic degree which is a means of differentiation - the online courses may bring the higher education system to a state of "inflation" of academic degrees due to the increase in the supply of academic studies and the decrease in the value of the degrees. 2) The fear of deterioration in the level of quality of online studies - A free model that stands alongside the development of a large supply of courses can lead to a deterioration in the level of courses and the development of a "Wild West", where certificates are given whose origin and value are not entirely clear. 3) the fear of reducing the personal dialogue between the student and the course lecturer, may result in the absence of the learning experience on the part of the learner and increased dropout from studies. 4) Limitations on the ability to evaluate students due to the implementation of unreliable digital models that will be an alternative to the testing methods used in the academy. 5) Damage to the population of lecturers and researchers due to the takeover of the academic market by large companies. The data for 2018 showed that despite the plan and effort, real and significant change like learning on the various higher education campuses has not yet taken place. And it seems that although some progress is being made, it is being made very slowly and is being observed at the practical and administrative levels and less so in the actual implementation of the teaching process [18]. It seems that the challenges that were presented in 2013 reflected the lack of readiness of the higher education system in Israel for online learning, something that later became (during the COVID-19 crisis) a major hindering factor in the promotion of learning.

On 11/3/2020, the greatest change occurred in the world of academia - This is the day when a "state of civil emergency" was declared in the State of Israel due to the Corona epidemic. The entire education system, including higher education, immediately switched to a procedure for learning during an emergency - a distance learning procedure. Ten days after receiving this notice, all institutions of higher education in Israel that include: About 62 higher education institutions, 8 research universities, The Open University, 20

budgeted academic colleges, 12 non-budgetary colleges, and 21 academic colleges of education [19] were asked to replace their traditional mode of teaching with online distance learning. This situation placed the higher education system in a challenging situation that required a rapid adaptation that had not been attempted before. This fact required the education system to act flexibly and exercise creative judgment to allow the continuation of learning under new conditions [20]. The future technological setup built for the Israeli education system instantly became a contemporary reality that required high adaptability of the faculty members in particular and the higher education system in general and all the future processes that were established and intended for short and long periods (The pace of their implementation is set to be realized between the years 2040-2022) became at once a temporary reality [21].

The data of the Council for Higher Education report that despite the challenges faced by the institutions, the students, and the faculty, Following the corona crisis, the total number of students in higher education institutions increased in 2021 by approximately 24,000 students (an increase of 8%) from 2020 and that the expectation for 2022 is an increase of about 4% from 2021 [22]. It seems that despite the difficulty due to online learning, The higher education system in Israel succeeded in meeting the challenge of distance learning and today it continues to be an effective solution in various academic institutions. The "corona years" managed to bring about a thorough examination of the educational reality of the Dasha, unplanned but very important which had a decisive impact on new teaching methods and concepts that incorporate rapid technological innovations and a reflection carried out throughout the period regarding the advantages and disadvantages that online teaching brought with it.

The Impact of the COVID-19 Crisis on Students in Israel

A survey conducted in 2020 in which approximately 525 students studying for bachelor's and master's degrees were examined, Examine the effect of the corona crisis on the students' perceptions of higher education institutions and also examine how the crisis and distance learning affect their success in studies, He found that about half of the students believed that practical knowledge and training for the job market is more important than studying theory and research. About a quarter of the students considered changing the profession they were studying at the time to a more practical one, and about half of them were still considered at the time of answering the survey or even starting the process of changing professions. About 75% of the students stated that the crisis makes it difficult for them to study - 41% stated that the factors that make it difficult stem from learning from home, dealing with children (for students who are parents), Lack of a learning environment and about a third stated that there is a difficulty due to financial difficulties. despite all that, about 58% of the students agreed that given the new reality created by the crisis, there is a growing need to reduce face-to-face teaching hours and hold more distance learning courses. 45% of the students felt supported by the academic institution throughout the crisis period, which encourages them to continue their studies, about a quarter of the students felt that distance learning made it easier for them to continue their studies despite the crisis, and over half of the respondents to the survey believed that they prefer to study the lessons in their free time, either by watching recordings of the lesson or with interactive lesson plans. In addition, about two-thirds of the students agreed that distance learning makes academic studies accessible to a larger audience. In light of these answers, it was found that 84% of the respondents stated that they intend to continue their studies as usual and/or finish their studies for that year [23].

Another study conducted among 390 undergraduate students which examined the factors that promote or monitor learning during the crisis found that the promoting factors originate from personal resilience, Use of learning strategies, self-regulation of learning, and proper time management. On the other hand, it was found that the factors that hinder learning originate from requests for learning that include: Lack of mood and concentration, lack of time, and physical conditions such as Poor internet infrastructure and the absence of a quiet study environment. In addition, it was found that there is a relationship between the quality of the internet infrastructure and the adaptation to online learning. Based on this, systemic recommendations were made to provide solutions such as lending cellular modems to students, Expanding the offer of the learning environment on and off campus, and adjusting the teaching methods and curricula. Recommendations were also written for the teaching staff: Preparing and guiding the students on how to learn, referring and guiding the students in time management, devoting time to creating a social presence

in the online learning space, and creating personal and group contact between the learners. The recommendations given to the students were: adjusting the home school environment, Updating the campus if there is a decline in the internet infrastructure, taking responsibility for online learning, and receiving support from the academic institution regarding responding to the field of learning [24].

Selected data findings from a comprehensive study conducted by the evaluation department of the Open University in which over 20 interviews of faculty members and over 70 interviews with students were conducted presented similar and even identical data to studies presented earlier, But in addition, it was found that from the point of view of the supervisors, about 70% of the teaching staff felt that there was a success in maintaining the teaching routine during the semester (during the Corona period) And this is because there was a proper systemic engagement and rapid adaptation of the faculty to the teaching methods and new technologies. Furthermore, about 40% reported that there was success in creating student involvement and interpersonal interaction during the lessons and there was impressive collaboration within the teaching teams. The lecturers also reported that there were support meetings for students which were effective but only about a quarter of the students were present. About 85% of the instructors reported that they control Zoom well and most of them also enjoyed teaching using this tool. On the other hand, the facilitators present the difficulties that arose: About 44% reported less attendance at meetings, the complexity of creating interaction and a personal relationship with the students, and the technological challenges placed before the teaching staff (such as technical failures during the meetings, software orientation, lack of professional equipment and limited teaching means). In addition, they reported that distance teaching becomes more complex with the larger group [25].

Start Up Nation

The term Start-Up Nation was coined by a writer and journalist in the "New York Times" - Tom Friedman, who described Israel as a country with a stronger entrepreneurial culture than any other country in the world mainly due to the number of start-ups the size of the population [26]. The State of Israel is currently considered a start-up country [27] which stands out in the proportion of educated people with a tertiary education (which currently stands at 50.1% compared to OECD countries at 38.6%), which constitutes an essential and central growth engine in the entire Israeli economy ([28], page 16) And it has more than 6000 active start-ups and an economy that is dominated by industrial high-tech and entrepreneurship supported by the government [29]. The nickname "startup nation" has been associated with the State of Israel following the success of many Israeli companies that have been able to establish their status as pioneers in a large number of fields, including medical systems, communication, internet, security, agriculture, Biotechnology, and more. The data shows that in the State of Israel there are more startups relative to the size of the population than anywhere else in the world [30, 31].

The data for 2021 indicate that during the Corona period, Against the backdrop of the high unemployment rate that led to a decline in the labor market and despite the layoffs carried out in the high-tech industry - the total number of employees in the industry increased by 4% (compared to an increase of about 7-8% in the previous two years). In 2020, high-tech workers accounted for approximately 9.8% of the total number of employees in the economy, and the proportion of high-tech employees in Israel grew in the last decade from approximately 7.6% to 10% [32].

The reasons for the success of the State of Israel and its transformation into a start-up nation are based on four main factors:

    A. Quality human capital that originates from education and training - Israel is ranked as one of the countries in the first places in the world in the proportion of academics with post-secondary and academic education among the 25-64 age group [33]. The percentage of engineers and scientists per capita is higher than in the countries of the world and it is considered one of the countries with the highest number of university degrees and academic publications per capita [34]. The data for 2020 indicate that the engineering track is the largest study track in Israel, containing approximately 18% of all undergraduate students. In addition, there are another 18,240 students who study mathematics, Statistics, and computer science for a bachelor's degree, and a total of about 54,000 students in the technological subjects [19, 35]

B. Capital and political support - Already in the 1990s, the government of the State of Israel established the technology incubator program that offers government funding of up to 85% of the project's costs in its early stages for two years. The purpose of this program is to foster start-up companies and minimize the risk for the investor. The venture capital industry in Israel has about 70 active venture capital funds, of which 14 are international venture capital funds with offices in Israel. Today, there are over 1100 projects that have completed the stages of the program and about 45% of them managed to receive additional investments from various investors. There are over 25 greenhouses throughout the State of Israel, all of which have been privatized. In addition to this, the State of Israel promotes entrepreneurship through the Investment Law, which grants foreign companies a reduced corporate tax rate and investment grants [34].

C. Strong R&D capabilities - Israel ranks second in the world in R&D spending per capita. It spends about 4.3% of its GDP on R&D (compared to the OECD average of about 2%) [35]. In addition to this, the State of Israel offers grants for 4 years covering on average about 25% of the salary of a new employee which is received by the employer. that and more, the Innovation Authority also provides support in a budget of approximately 400 million dollars for R&D funds and offers R&D grants from a plan that has been declared approved [34].

D. Israeli culture - The State of Israel is a country that consists of a multitude of different cultures that diversify the face of society, moreover there is immigration due to the "Law of Return" which allows all Diaspora Jews to obtain Israeli citizenship and immigrate to the State of Israel as part of the Zionist ethos of kibbutz Galuyot (Gathering of Israel) in the Land of Israel, and establishing a home for all the Jews of the world. In addition, military service is mandatory in the State of Israel (Recruitment at the age of 18, which includes service for men for about 3 years and women for about two years) During this the young people acquire command skills and learn to manage projects, deal with and cooperate, make decisions, initiate and develop leadership. there is a high sense of personal responsibility and success orientation, as well as technical training within the military service. In addition, Israeli culture has the genome of the entrepreneur in which failure is not considered a major disaster - it is known that most entrepreneurs have failed part of their way and learned from their failures, that is: those who want to succeed must learn from their failures [36].

METHODOLOGY

To examine how the higher education system can preserve the advantage of the State of Israel as a start-up nation, a qualitative pilot study was carried out.

The Purpose of the Study
1. To define what are the expectations of high-tech employers in Israel from bachelor's degree graduates who are accepted for work.
2. To characterize the gaps between the needs of the start-up industry in Israel and the knowledge, skills, and abilities of graduates of higher education institutions in preparation for their acceptance to work in the hi-tech industry in Israel.

The Research Questions
How the institutions of higher education in Israel,

In the post-Corona era, can Israel's supremacy/strength be preserved as a Strat Up Nation-state?

The Research Method

The qualitative research method - Examining the narrative of managers in the high-tech industry on the issue of adapting graduates to absorption in the industry. Through the qualitative research, we will provide a space for brainstorming that will allow in-depth insights to be drawn.

The Study Population

20 managers in the high-tech industry - Department managers and senior managers in a variety of companies in Israel. Locating the research population is carried out using personal connections, professional communities, direct contact with the human resources and welfare departments in high-tech companies, and Personal acquaintance with managers in the industry.

The Research Tool

The managers' survey was built on a Google survey format and consists of two parts. The first part describes the profile of the participant, the second part consists of five questions that aim to indicate the perception of high-tech managers regarding the graduates of higher education in Israel before they are accepted for work.

Question 1   deals with the expectations of bachelor's degree graduates before they are accepted for work
Question 2   deals with the characteristics of skills and abilities necessary in the high-tech world
Question 3   deals with the gaps between the needs of employers and HEI graduates
Question 4+5   deals with recommendations for bridging the gap between degree programs and employers' needs the questionnaire is based on previous studies and reports dealing with the subject [32, 37-40]

Distribution of Questionnaires

On the dates 15.10.2022 until 8.11.2022, about 100 questionnaires were distributed to managers of leading high-tech companies in Israel. The distribution will be done by digital means (WhatsApp, email). To build the relevant population for the study, we used databases and Facebook communities (There is a detailed list in the appendices chapter).

Findings of a Qualitative Pilot Study

Profile of Study Participants

Of the 100 questionnaires distributed in the pilot study, 20 complete questionnaires were received. All participants in the study hold senior positions in high-tech in the positions of CEO (1), project managers and information systems (17), business development (1), and high-tech researcher (1). Distribution of years of experience in high tech among the participants:1-10 years 40% of participants (8); 11-20 years - 40% of the participants (8); 21-30 years 20% of participants (4).

Analysis of the Research Findings

The research findings were analyzed using 4 main themes:

Theme 1: The Profile of the Skills Expected of Graduates of Higher Education Institutions Who Are Recruited to Work in Israeli Hi-Tech.

    A. Personal skills - Israeli hi-tech managers expect to integrate an employee with high learning skills "especially of new programming languages and development tools" (Eran R.). The personal skills noted included: the "ability to work under pressure" (Yuval M.); the "Ability to stand in front of an audience, the ability to express oneself at a high level, with persuasive skills" (Asaf Y); "High social skills" (Sivan D.); "Ability to work with multiple interfaces (Yuval M).

    B. Personality characteristics - Hi-tech managers in Israel expect to work with a graduate who is a "productive person" (Roi Sh.), Has "high ethics" (Adi L.) "Willing and motivated" (Ofer S.),

is "Independent" (Noa B.), "Curious" (Noa B.), and "has excellent communication both within the team and can work with customers" (Yael B.).

    C. Knowledge - The participants expected an adult hired to work to have "basic technical knowledge of computers" (Michel R.); "Technological understanding of digital products and their interfaces" (Yoav S); "Knowledge of development management" (Yuval M); "Financial management of a client and a project", and has the skills and ability for "matrix management[2]" (Eyal F).

Theme 2: The Skills That Need to Be Developed Among Students During Their Studies at the Academy.

    A. Learning skills - "Independent learning" ability (Yaron K.); "Ability to reproduce and apply what one learns" (Liran L.); "Ability to research topics and learn on your own (self-taught)" (Noa B.); "Learn practical hard skills that are relevant to professions in the market" (Udi G.); "Learning from diverse sources - tools for research and learning" (Amir G.).

    B. Teamwork skills - "Ability to work in a team with people who are different from you" (Ran S.); "Teamwork that includes more than two people when each has a clear and defined role and the ability to join forces so that the puzzle fits together" (Shahar D.).

    C. Digital skills and computer skills including "basic knowledge of Office Word, Excel, etc." (Michel R.).

    D. Rapid adaptation to changes.

    E. Presentation ability ("and explaining material to those who understand nothing about it" (Yael B.).

    F. "Ability to think logically - separate identities, similarity and difference" (Yuval M.); "Ability to analyze data" (Asaf Y.); "Analytical thinking" (Liran L).

    G. Ability to observe.

    H. Drawing conclusions from a long and in-depth project that includes thinking about the long term.

    I. Building a Gantt chart of a project. Break down the steps and give each timetable and criteria for success.

    J. Ability to work under pressure.

    K. Creativity - "Thinking outside the box" (Aviv Y.).

    L. Ability to make decisions under uncertainty.

    M. Summarizing abilities and dealing with long texts.

    N. Writing and reading in English (a prerequisite for high-tech).

    O. Awareness and self-criticism - "to learn how to learn to know their strengths and weaknesses and how they are reflected in teamwork" (Nadav Y.).

    P. Management (human, technological, technical, priorities, decision-making, cost-benefit).

    Q. Technologies - understanding the history, development, and essence. System and architecture analysis.

Theme 3: The Level of Adaptation of the Training of Graduates to the Job Requirements in the High-Tech Market in Israel. 14 participants (which constitute 70% of the respondents) We pointed out that the higher education system does not train its graduates in a way that matches the actual job requirements in the high-tech market in Israel. 6 participants (which constitute 30% of the respondents) stated that the higher education adequately prepares the graduates.

Theme 4: The Most Prominent Gaps Between the High-Tech Requirements in Israel and the Graduates of the Higher Education System in Israel.

    A. Practice – "The practice is not taught" (Asaf Y.), "A bit like the education system that teaches the knowledge and not ready for life" (Udi A.), They don't teach "techniques and tricks". (Reciprocal spatial relationships)" (Navad Y.)

    B. Self-study – "We do not allow self-study of a basic SWOT that will help to improve" (Adi L.)

    C. Ethics – "Lack of ethics" (Roi S.)

    D. Money – "A total lack of understanding about what "money" is. (Sivan D.)

E. Personal skills – There is no training in the subjects of "standing in front of an audience", "ability to make a presentation", or "persuasion skills" (Yuval M.)
F. Team skills – There is no preparation for teamwork. There is a "lack of teamwork" (Nadav Y.)
G. Work Environment – "They don't teach work in a dynamic and changing environment" (Ofer Sh.)

FINDINGS

Two main goals were defined for this study. One, to define what are the expectations of high-tech employers in Israel from bachelor's degree graduates who are hired. Indeed, the research findings point to the employers' expectations, which were classified into three main areas:

A. <u>Personal Skills</u> - In this area, the research participants (representing the employers) stated that they expect to receive an employee with high learning skills, With the ability to work under pressure, with high social skills, who can function in a multi-interface environment. Indeed, studies indicate that the most important skill in the 21st century is the ability to learn, As Alvin Toffler said "The illiterates of the 21st century will not be those who cannot read and write, but those who cannot learn, ignore and relearn" [43]. Indeed, in an environment where it is necessary to adapt to rapid technological changes - The ability to learn is essential more than ever and the trend of "lifelong learning" will be part of the culture of organizations in the future to stay current and adapt to changes and technological innovation. An article published by McKinsey claims that "learning itself is a skill" [44] and notes that the World Economic Forum calls on individuals and organizations to continually refresh their skills, also in light of the technological changes that affect the stability of the world of work, but also and especially after billions are dealing with the Corona crisis. The demand for social and communication skills is also supported by recent reports and studies. For example, a survey conducted among 18,000 people in 15 countries by the McKinsey company [45] revealed 56 basic skills that will help citizens integrate into the future world of work. "Communication" (ability to speak in front of an audience, ask the right questions, synthesize messages, and perform active listening), as well as the ability to develop interpersonal relationships (empathy, building trust, humanity, and the ability to connect) are mentioned in the report as essential skills. Also, the Institute for the Future (the world's leading organization for the future and foresight), Published 2020 a report describing the skills of the future and indicating 10 necessary skills for the labor market, among them the skills of "Social intelligence" defined as "the ability to connect with others deeply and directly, to sense and provoke desired reactions and interactions", "ability to connect to others deeply and directly, to sense and stimulate reactions and desired interactions" ([46] pp.8).

B. <u>Personality Characteristics</u> - The second category dealt with the personality characteristics of the graduates. The research participants stated that they expected graduates entering the workforce to have high ethics, desire, and motivation, be Independent, curious, and have excellent communication inside and outside the company. An article published by the consulting firm Deloitte states that "75% of organizations claim that ethics related to the future of work is important or very important to their success" [47. This refers to issues related to workplace requirements, For legal and regulatory aspects of artificial intelligence, rapid adoption of changes in the composition of the workforce, and pressure from external stakeholders. but not only. Olatorera Oladeji [48] defines personal ethics at work as consisting of self-respect, loyalty, integrity, Fairness, responsibility, and honesty. This ethics can contribute to creating a solid relationship between employees, carrying out a good division of tasks between the team members, allowing independence at work, working with trust, and contributing to the overall growth of the organization.

C. <u>Knowledge</u> - The third element that the study participants mentioned deals with the knowledge of those recruited for the job. In this context, they would expect the new employee to have a

technological understanding of digital products and their interfaces, knowledge of development management, and the ability for matrix management (in a flexible organizational structure that allows knowledge sharing and work hierarchy on demand). The Institute for the Study of the Future [46] refers to both "technological understanding" and the ability to "matrix management" in 4 skills (out of 10) defined as the important skills in the future labor market and they are: "New Media Literacy", "Cognitive load management", "Design thinking" (design mindset), and "virtual collaboration".

New media literacy is Defined as "the ability to critically evaluate and develop content that makes use of new forms of media and to leverage these media for persuasive communication" (page 10)

The ability to "manage cognitive loads" is Defined as "the ability to distinguish importance and filter information, to understand how to maximize cognitive function through a variety of tools and techniques" (Page 12).

"Design mindset" is defined as the ability to represent and develop tasks for work processes for desired results/outcomes. (Page 11).

The ability for "virtual collaboration" is defined as "the ability to work productively, Express involvement and demonstrate presence as a member of a virtual team" (Page 12)

The second purpose of the study was to characterize the gaps between the needs of the start-up industry and the knowledge, skills, and abilities of the graduates of the institutions in preparation for their absorption in the labor market in the high-tech industries in Israel. The current study shows that the majority of participants (70%) state that the higher education system in Israel does not train its graduates in a way that matches the requirements of the high-tech market in Israel. The most notable gaps noted were in the areas of lack of practical knowledge and actual practice. In the field of skills and abilities, the main gaps noted are the lack of development of personal skills such as standing in front of an audience, delivering a presentation, persuasive skills, Teamwork skills, and skills to work in a changing dynamic environment. Alongside these, gaps were also noted in the field of personal ethics, and a lack of understanding and knowledge in the field of financial education and simply an understanding of what money is - How to deal with money, how to manage work against a budget and understanding the role of capital (money) in the world of work.

The gaps found in Israel also arise in a recent study conducted in the United States [49] that examined what employers want in terms of the "soft" skills of engineers among 500 companies and organizations. The study notes that although engineers have "hard" skills (in an engineering context, referring to technical skills or abilities required to perform tasks related to technical work) They do not meet the needs of 24 out of 26 "soft" skills (personal traits, attitudes, and behavior) defined by the organizations and chiefly the ability to communicate effectively with a variety of groups of people. In addition, most employers stated that when they recruit new employees, they emphasize "soft" skills more than technical knowledge. They point out that the "hard" skills can be acquired in higher education institutions in a structured way that can be graded according to the reputation of the educational institutions, but what differentiates one graduate from another are the "soft" skills (such as the ability to work under pressure; plan and think strategically; flexibility and adaptability; self-motivation; handle multitasking; communicate actively with a wide variety of people; present an effective presentation; deal with uncertainty about people and situations, etc.).

The research question was how the institutions of higher education in Israel, in the post-corona era, can preserve the supremacy/strength of Israel as a start-up nation-state. In this study it emerged that to provide qualified graduates, Skills and knowledge are essential to the high-tech industry in Israel, and thus to preserve its strength and growth, the following abilities must be cultivated among the students, as indicated by the research participants:

    A. Cognitive abilities: autodidactic, ability to adapt to changes, data analysis, analytical thinking, drawing conclusions, creativity, Ability to research, critical thinking

    B. Personal skills: Self-learning ability, ability to apply new knowledge, learning from several diverse sources, working under pressure, decision-making, self-awareness, self-criticism

    C. Digital skills: digital skills, Knowledge of software, understanding of technologies, systems management

D. <u>Communication skills</u>: presentation skills, Writing and reading in English, interpersonal communication skills

E. <u>Management and teamwork skills</u>: human management, technology, decision-making, setting priorities, cost-effectiveness, ability to work in a team (with different people), Understanding the organizational system and the role of each individual in the team.

"Israeli Hope in the Academy" and the "Aloma" organization lead a variety of programs in Israel together with the Council for Higher Education to promote learning that combines professional experience to provide students with skills necessary for the changing world of work. In this framework, a plan was published "Learning and teaching promote employment". This paper brings together 12 skills for integrating into the labor market:

TABLE 3
SUMMARY OF SKILLS FOR INTEGRATION INTO THE LABOR MARKET

Interpersonal skills	Personal development skills	Organizational skills
Emotional and social intelligence	Creativity	Capable in a diverse environment
Teamwork	Mental flexibility, adaptability	Time management and task prioritization
	Persuasiveness, written and email communication, self-marketing	Digital literacy in new media
	Independent learning	Solving complex problems and making decisions
	Critical thinking	
	Initiative, proactivity	

The program offers to integrate into the courses taught at the academy the cultivation of skills needed in the labor market, including project-based learning; exploratory learning; Peer learning; Peer review; field missions to get to know the labor market; Personal assignments to practice personal skills such as Self-presentation, tasks related to time management and more.

To define the teaching methods that connect the academic knowledge and the skills required in the world of work, about 50 lecturers from different academic institutions met to hold peer learning, the result of which is a document that defines how the skills needed in the labor market can be integrated into teaching in institutions of higher education [50]. The document translates the skills needed for teaching methods and practical experience into practice and can be used as a working framework for any faculty interested in preparing students for optimal integration into the labor market.

DISCUSSION

When examining the role of higher education institutions in preserving the strengths of the State of Israel as a "Startup Nation" the reference to the global context of higher education scenarios in the future is essential.

It seems that it is possible to integrate the training of the students by the higher education institutions (so that they fit the needs of the hi-tech market in Israel) Along with the global trends of higher education in the future in a variety of fields:

A. <u>Trend of digitization of education</u>: This trend deals with the transition to online learning, the creation of innovative learning spaces, the integration of digital assistants in learning and teaching, and the operation of smart campuses. Preparation of students for the labor market can be applied to all of these through: Practicing and acquiring digital skills, Extensive use of

experiential learning, development of analytical skills through the use of big data, and use of innovative learning spaces to develop project-based learning and research skills. In addition, online learning can contribute to strengthening the student's learning skills but also curiosity, The student's motivation, and independence.

Project-based learning can establish social skills, and strengthen the teamwork skills and communication skills of the students while practicing and implementing projects that the students run and initiate.

In addition to all of these, the academies can develop preparation courses for the employment market that include the acquisition of "soft" skills that include, among other things, the ability to give presentations, improve English skills, and more.

B. Trend of cooperation between corporations and employers: The initial application could be in the field of deepening the cooperation between the academy and employers in a way that the academy defines the needs together with the employers and integrates their needs into the curricula. An in-depth possibility could be in the development of mutual responsibility in which, on the one hand, the academy provides the necessary skills, and on the other hand, Employers finance the necessary training. In addition to this, and at the initiative of the academies, carry out research into local needs and respond to the construction of dedicated programs that provide the profile of the graduate according to the needs of the labor market. Another aspect is the connection between digital giants and the curricula - so that the latest developments are integrated into the curricula, And the students will be able to practice and gain an in-depth knowledge of the technological innovation before their absorption in the labor market.

And finally, a joint activity between the employers and the academy that will contribute the highest value to both the student and the employers will be the integration of the students in practical work (internship) and as an integral part of the study programs and eligibility for the degree.

C. Trend of lifelong learning: Practically, the academy can build short continuing education courses according to the needs of employers, or offer completion programs for those interested in integrating into the industry or furthering a specific specialization by the development trends in the high-tech market. Through the construction of a personal learning path for each student adapted to his skills and areas of interest on the one hand, and on the other hand, the development of a future career path that defines the skills he must acquire, students can be equipped with experiences and knowledge that will help them integrate optimally into future employment.

Another area that is recommended to be developed is the assimilation of a learning culture among the organizations, including academic accompaniment for organizations, the Development of training programs for organizations according to the branches of specialization and the needs of the departments, and the development of dedicated programs for the employees of the organizations (whether in training programs within organizations, online courses for organizations or face-to-face courses on demand).

TABLE 4
CONCENTRATION OF HIGHER EDUCATION SCENARIOS AND PREPARATION OF THE STUDENTS FOR THE LABOR MARKET

Main trends for the future of high disposal	Preparation of students for the labor market
Digitization of education Smart campus Digital assistants Online learning Innovative learning spaces	The acquisition of digital skills; use of big data; The personalization of learning enables the strengthening of personal skills, experiential learning, project-based learning, learning from the analysis of big data, online learning enables the practice of virtual work, the use of workspaces for creators
Cooperation of corporations and employers' Digital giants Local and regional share Purchase of education supplies	Close cooperation with corporations and employers; reference to the developments of huge companies; Cooperation with local and regional needs, learning of specific skills funded by future employers
Lifelong learning Personal education Completion of skills and qualifications Courses adapted to the changing labor market	Practicing lifelong learning habits; strengthening areas dealing with personal empowerment; Improving the skills of the graduate according to the needs of the market and plans for the occupational future

RECOMMENDATIONS

For further research, we recommend expanding the research population so that it represents all high-tech industries in Israel by their proportion of the entire start-up industry in Israel and includes a significant number of participants. Another recommendation is to characterize in a focused manner the needs of high-tech employers according to a thorough classification of knowledge, skills, abilities, training, and practical experience. thereby reaching insights that can help define the necessary improvements in the curricula of the higher education institutions in Israel so that they provide the best response to the needs of the labor market in Israel.

LIMITATIONS

The main limitations of the research result from the fact that the research at this stage is an initial pilot study and is limited in scope both in terms of the number of participants and in terms of the representation of all start-up industries in Israel. The questionnaires are based on "brainstorming" and are open regarding the issue of adapting a graduate of a higher education institution in Israel to the high-tech market and are not based on a targeted characterization and classification of skills, qualifications, knowledge, and abilities.

ENDNOTES

1. Industry 4.0 – The fourth industrial revolution is characterized by advanced digital technologies (Internet of things, cyber systems, smart manufacturing, artificial intelligence cloud computing, and more). [10]
2. Matrix management – Hierarchy of work according to demand in a demanding manner and according to business needs [41]. In matrix management, the organizational structure is flexible and enables knowledge sharing [42]

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