Università
Ca'Foscari
Venezia

Master's Degree

in International Management

Final Thesis

Education Technology and the Startup Nation: a Black Box Reasoning

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Academic Year
2018 / 2019

Life is not easy for any of us. But what of that?
We must have perseverance and above all confidence in ourselves.
We must believe that we are gifted for something
And that this thing must be attained.

Marie Curie

TABLE OF CONTENTS

INTRODUCTION

The last years have been characterized by an incredible push to innovation and the technological world is creeping in quite all the industries making them evolve like never before and reaching an outstanding level of progress. Investments in technology increased, higher level of specialization is required and the world's population needs to spread its skills and knowledge to be aligned with its needs. Technology and its pervasiveness reached the educational world and started to affect the teaching-learning process, making it slowly change its approaches and nature.

Educational technology is a powerful thing, an industry full of both opportunities and challenges that are allowing Israel to be recognized as a driver of change and so as an example and an inspiration for other countries: the ability to compete with the world's biggest economies is increasingly putting the country in a winning position. EdTech is currently seen as an engine of innovation in an industry that is typically highly conservative. The digitalization of the didactic processes, together with the stretching of the learning paths and the introduction of tech in classrooms, is bringing a flow of disruptiveness in education. Everything is slowly changing: the roles, the approaches, the devices and the mindset.

I moved to Tel Aviv for four months ending up discovering a world full of potentiality. But why Israel? The state is at the cutting edge for the general aspect of innovation and this, as a consequence, touches the educational world too. The terrific development of the country – from tents to skyscrapers, from agriculture to tech hubs – and the personal push of the population for redemption made the country one of the most important innovation clusters of the world, in a very short period of time. Again, the closeness of Israel and the need for protection against the surrounding countries made the land concentrate its strengths and resources on an effort to internal development. As Israel gained recognition over time, achieving the role of Startup Nation, Tel Aviv is now globally considered as the Startup Capital. The government is trying to enhance the country's potential both inside and outside the borders and it is leveraging all the

aspects related to technology and technological innovation in order to make Israel one of the best countries in this wide field.

This challenging project started with the aim of analyzing the EdTech world in Israel and detecting which are the positive and the negative features of startups in this specific field, potentially leading them either to success or to defeat. Thanks to MindCET, I have directly been in contact with the land's reality and I had the possibility to work with the seven companies – CodeMonkey, Coqua.Labs, Eton.News, Inflow, KidiStartup, Plethora, Storyball – that took part of such project. Every research, every talk, every interview was based on using a qualitative approach that allowed me to deepen specific and personal aspects, having the power to go beyond the numbers and to discover crucial features.

CHAPTER 1

AN OUSTANDING DEVELOPMENT [1]

1.1. How everything began

Israel is a quite young nation, founded 14th May 1948, moment symbolizing a great leap for the country, after many years of backwardness and sufferings.

Figure 1: The first group of people who settled in Tel Aviv.

Source: Panorama.it, 2018.

[1] The whole historical information and data represented in this chapter came from the book "Start-up Nation: The Story of Israel Economic Miracle", a New York Times Bestseller written by Dan Senor and Saul Singer in 2011.

At the end of the nineteenth century, a group of Orthodox Jews established a farming community in the center of Israel – Petach Tikva – a few kilometers east from the city we know nowadays as Tel Aviv. At the very beginning, the settlers used to live in tents but later they hired specialized Arab builders and started to live in mud hut. This solution, that should have been more efficient for the people, turned to be even worst: when it rained and the rivers overflew, the cabins were destroyed, and the road were washed out. Health problems started to increase too because the air and the water were not clean, and people started to get sick from malaria and other deadly diseases. And even if winters were not that harsh, farmers savings were running out and many families lived in starvation.

In 1883, thing started to change. Edmond de Rothschild, a Jewish banker and philanthropist from France, provided to this land a huge financial support to help the population. Thanks to the advices of experts, people started to plant trees – such as eucalyptus – near the swamps created by the rivers to try to eliminate them. After time, the consequences of malaria dropped, and many other families came to the village and started living there. At the beginning of the 1900, the population doubled its size, the national production level increased fourfold and the average annual economic growth reached 28%.

This striking growth could not happen without the waves of immigrants who brought their contribution not just in terms of number of people but also with a brand-new atmosphere that slowly changed the economy of that land. These flows of people were coming from all over the surrounding areas but also from Europe. In 1906, David Gruen, a young lawyer, arrived from Poland and changed his name in Ben-Gurion, as the famous Jews general of the 70 CE, and quickly became the undisputed leader of the settlement. His people saw him as a combination of different religious and non-religious leaders such as Moses, George Washington, Garibaldi and God Almighty (Oz, 1983). He is also considered the first Israeli entrepreneur who was able to start from a visionary plan and to create a nation-state and so to build a country.

Ben-Gurion also faced a very delicate phase for the Jewish population until the end of the II World War, during which millions of Jews in Europe were deported to

extermination camps, others fled to Palestine and others again were forced to hide and lived in terrible conditions. He managed the clashes with the British Government after the White Paper of 1939 with which United Kingdom denied the access to Palestine to a number of Jews refugee, through oppressive and cruel restrictions. In this way, the leader was dealing with two opposite relations with the British: on one hand, he was fighting jointly with them in Europe and, on the other hand, he was fighting against them in Palestine.

Even all these problematic situations, the leader was focused on building a state. He was realistic and effective and every strategy – political, social, economic and military ones – was aiming to construct the country. Ben-Gurion was extremely focused on the future development of the rising state and so on attracting governmental incentives and private capitalists' investments to make the urban centers grow and build advanced infrastructure.

Figure 2: The announcement of the birth of Israel on The Palestine Post of 1948.

THE PALESTINE POST

CARL MARX

STATE OF ISRAEL IS BORN

Most Crowded Hours in Palestine's History

JEWS TAKE OVER SECURITY ZONES

Egyptian Air Force Spitfires Bomb Tel Aviv; One Shot Down

U.S. RECOGNIZES JEWISH STATE

Proclamation by Head Of Government

2 Columns Cross Southern Border

Etzion Settlers Taken P.O.W.

Special Assembly Adjourns

Source: Israel Ministry of Foreign Affairs, 2019.

1.2. From the kibbutz to the economic development

The former Israeli economy was based on agriculture and on specific settlements called kibbutz, where people were used to produce everything they needed for living and self-sustenance. They were also hyper democratic and hyper collective too: there was no private mail, children were raised together, there was no police. The constraints faced by these populations were solved through specialization and high spending on R&D: for example, problems related to water were overcome and turned into assets by developing particular skills over desalinization, irrigation and desert agriculture. The deep purpose of these autonomous villages was to try to avoid the private property and to create the maximum level possible of equality among the members of the community.

But life inside kibbutz was just the beginning. In the middle of the twentieth century, the economic growth of Israel was worth 13% a year and then, from the '60s, it slowed down to even less than 10% every year. This was not just a simple period of economic growth: Hausmann refers to it as a leapfrog and so a situation in which a developing country faces a sudden growth in its per capita wealth that leads the country itself to shrink the gap with the developed ones. In this scenario, the government acted against the privatization process and the entrepreneurship trying to slow down the country's development but, if this would not had happened, Israel would have grown faster and in a more exponential way.

In the early stages of this incredible development, the Israeli population focused on large-scale investments such as factories, roads, water distribution, ports, electricity, and kibbutz have quickly been replaced with houses. This brought more fast-growing attitude to the country but, ate the same time, inequality within the population started to get more evident. The government spending budget and efforts over big projects and infrastructures and this not came without accusations: the population was still living in backwardness' conditions, eggs and milk were scarce and the refugees who were constantly coming were used to live in tents.

Figure 3: Tel Aviv population living in tents at the beginning of 1900.

Source: Jewishvirtuallibrary.org, 2019.

During this development's phase, entrepreneurs were not so considered inside the actual scenario, but this aggressive growth led the economy to break down due to the increased complexity. And, in this situation, the government understood the importance of these characters for Israel and its evolution and expansion: in the mid 60s, the new-born state shifted its attention from a focus over a more generalized development for the country as a whole to a situation in which private entrepreneurial trends were stressed in order to make the country continuously grow in power.

But suddenly Israel started to face huge problems related to war and defense. The heaviest challenge of the country was the Six-Day War battled the first week of June 1967 against Egypt, Jordan and Syria, at the end of which the country won many lands such as Golan Heights, West Bank, Sinai Peninsula and the Gaza Strip. This brought again the need for Israel to increment the spending over infrastructure, defense installations and security, but this did not last for a long period of time: after six years, Israel was involved in another war that led to three thousand deaths, even more injured people and a significant damage of the infrastructure built until those days. The Israel Defense Forces were constrained to find solutions to protect the country and made the decision to move a consistent part of the labor force from the industries to the reconstruction of

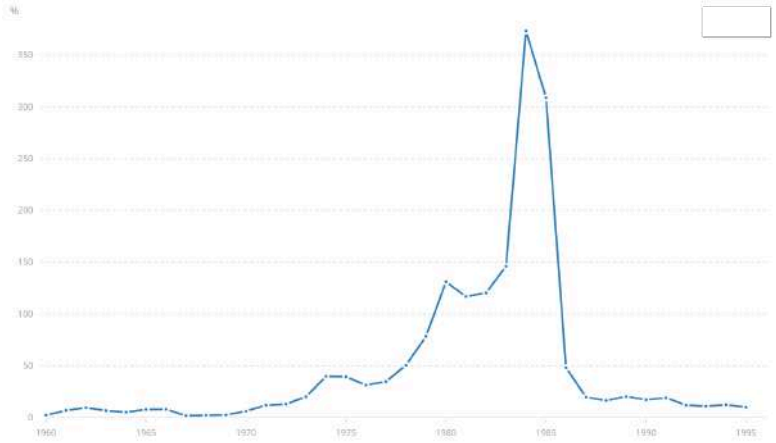
the country, even if this led to a deep paralysis of the companies and so of the economy too.

What was particular of this situation was that the economic environment did not affected the income of the domestic workers because of governmental choices that turned out in incredibly high levels of public debt. In order to try to compensate this problem, the tax rates were risen in order to pay back the deficit, but this led to an increase of the interest's rates. Recovery turned out to be quite unlikely mainly because of the governmental monopoly over the capital market: the highest powers of the country exercised a heavy control over loans financing and debt instruments for both private customers and businesses and commercial banks were forced to acquire non-negotiable public bonds or to finance private sector loans.

Other infrastructures and services needed to be developed in a more conscious and widespread way such as the banking system, universities, phone lines and telephones, major roads and highways, television, supermarkets offering international products, cars.

Later those years, Israel faced a period during which inflation grew dramatically – mainly because of the rise of the oil prices – from 12% in 1971 to 78% in 1979 and from 131% in 1980 to 373% in 1984. As a consequence, the hyper-inflation caused an exponential increase in the prices of primary goods and so a situation in which families could not afford to buy food, furnishing and basic assets for living. But the most important reason that led to such a problematic situation for the country need to be found in the indexing policies taken by the government: prices, wages and rents were associated to the Consumer Price Index and this, at first, seemed to protect people from inflation itself but, later, it turned out to be the fulcrum of the inflationary spiral.

Figure 4: The inflation rates from 1960 to 1995 on consumer prices.



Source: World Bank Group, 2019.

The outstanding point of this analysis should rely on the power of the country to transform itself from an isolated and underdeveloped area to a blooming and technological country in such a short period of time that made Israel one of the most developed countries in terms of business and the startup sector, technology, national and cyber security and medicine.

In the past and during the expansion and the economic growth of the country, Israel saw substantial flows of immigrants coming from the near continent Africa and, more precisely, from Ethiopia and Sudan. Here, a great part of the population was Jewish and Zionist, lived in dearth and under an anti-Semitic repressive regime: this situation made people dream about moving to Israel. Families started to save money to plan the trip, walked barefoot for miles to reach Egypt, the Sinai Desert, Beersheba – the southern metropolis of Israel – and finally arrive to Jerusalem. During the tough journey, many men and women were either thrown in prisons or tortured or killed. From 1984 to 1985, the Israeli government started a secret initiative called Operation Moses aiming to bring Jews Ethiopians to Israel: hundreds of young people were stuck into airplanes and brought in Israel to give them full citizenship according to the belief that there should be a place for all the Jewish people in which they would not need the visa to live in (Weiseltier, 1984). This operation was followed later, in 1992, by another identical project called Operation Solomon, in which almost 15.000 people were brought to Israel

and, by the end of the century, the country absorbed nearly 40.000 Jews Ethiopians. But all the young women and men arriving in Israel had to understand how to manage all the cultural and lifestyle differences with their country of origin: they did not know how to read and write, they used to have neither cars nor industries, banks and supermarkets.

Figure 5: Ethiopians into an airplane ready to fly to Israel during the Operation Moses.

Source: Ilpost.it, 2016.

Another important wave of immigrants arrived from the former Soviet Union. After the collapse of the State at the end of 1991, Russian Jews people started to move to Israel. They had to face lots of problems mainly related to the language, but later on their high level of education and specialization turned out to be a problem too: for example, an incredible number of Russian engineers arrived in the country and, since they could not find a job in their field, they were obliged to choose different and lower level employments, so unemployment and underemployment became widespread towards the community.

It is easy to understand the importance of the role of immigrants in Israel's life and development. At the foundation of the country in 1948, the population was assessed to be slightly higher than 800.000 inhabitants while, in 2018, the estimation was almost 9

million people. Currently the foreign-born Israeli citizens are more than 1/3 of the total population and the majority of the inhabitants are either second or third generation immigrants' descendants or immigrants themselves. It is a truly multicultural country in which more than 70 different nationalities from all over the world reside.

The last flows of immigrants have arrived in the moment in which the country was living the technological boom – as the majority of the other developed countries in world – and so a period of real obsession over research and development, education and entrepreneurship. As the venture capitalist Erel Margalit said that to understand this tendency we need to focus on the fact that we are talking about immigrants. In Europe, for example, where many established families lived and worked in big companies owned by the families themselves, with all kind of comforts, no one would have accepted to quit everything in order to start a new, uncertain and risky business in a brand-new industry. While, on the other hand, immigrants would: they have left their home country and they usually were poor so their mindset and attitude were different and, in a certain way, they were more focused on trying to achieve and win something instead of the possibility to lose what they already had. During his mandate, one of the top priorities of Ben Gurion was immigration. Foreign Jewish people needed to be helped to come to Israel and, on the other hand, they were needed by the country to fight in the wars, develop the economy and to bring life there.

On November 1947 Ben Gurion declared the willingness to create a new state and his statement was accepted by the UN. The day after, Israel was attached by seven Arab surrounding countries and this made clear the need for an efficient military defense force. Nowadays too, the country is fighting every day against enemies from other states such as Iraq, Lebanon, Syria and the self-proclaimed Palestinian State (Gaza Strip, Cis-Jordan and West Bank area) and is spending the 50% of the State budget for wars and to train people during the conscription. The mandatory military service was established: boys and girls at the age of 18, right after the end of the high school, are called to serve the state for a period from one year and a half to three years. After exams and psychological tests to select the people that best fit with the need of each specific division, boys and girls spend half a year over training on both fighting (hiding, attacking,

protecting, using guns and submachines, shooting) and management subjects (leading other people, using the right number of bullets, taking decisions) and then they actually fight for their country, risking their lives. This is not something people can choose and it also does not end at the end of the mandatory period: after it, people become reserves and they can be called to serve the country for many years for a precise amount of days every year, depending on the job and on the physical conditions.

Figure 6: Girls and boys practicing during the mandatory military service years.

Source: Vice.com, 2013.

One of the main point of the mandatory military service is that everyone is called to serve the country, without making any distinction of gender, race, social class and wealth, physical conditions and personal characteristics, and this allow to melt and mix the population, create cohesion among the society, build strong relations and life-long friendships. People in the same district and battalion become brothers and sisters. But the most important thing is the experience that such event brings to people: it is not just fighting but controlling, explaining, knowing each other. Usually, at the age of 24, boys and girls get the rank of captain and manage and run one hundred people in dangerous conditions. Then, at the age of 27 they become commander. The conscription for Israelis is not a question. They born and grow up knowing their future – without the possibility

to choose – and serving the country is a matter of pride for them. Even teenagers with physical and mental issues, who are normally exempted from the military service, insist to wear the uniform and to volunteer in the army. The only exception is the orthodox extremists who refuse to serve the country even if this is seen as an act of profound dishonor. The military service is usually seen as a strength for young people searching for a job because the experience gained during the military service is usually associated to a factory and so a place in which people have to deal with budgets, resources, training and managing people, learning how to think differently and in a forward looking perspective.

Most of the entrepreneurs, startup founders and executives underline the power of conscription and how it deeply affected their businesses. They describe it as a moment in which you need to be open-minded and creative, to think in a different way to solve problems, to achieve a result with a limited amount of resources.

1.3. Macroeconomic characteristics[2]

List 1: Israeli macroeconomic situation according to the Bank of Israel.

Class	Criteria	Amount	Year
Currency	Monetary unit	NIS = New Israeli Shekel, 1 NIS comprises 100 Agorot	
	Exchange rates	1 NIS = 4,0018 EUR[3]	2019
GDP	GDP	353.268 billion USD	2017
	GDP per capita	40,543.584 USD	2017

[2] The data here expressed have been collected on 15th May 2019 thanks to the information researchable on Bank of Israel (www.boi.gov.il) and World Trade Organization (www.worldbank.org) websites.

[3] The exchange rate refers to the one collected by Il Sole 24 Ore (finanza-mercati.ilsole24ore.com) on 15th May 2019 at the end of the day.

	Average annual GDP growth rate	3.445%	2017
Employment	Unemployment rate	4.1%	Q1/2019
	Labor force participation rate	64.13%	Q1/2019
	Number of employed Israelis (thousands)	3,965.4	Q1/2019
	Percentage of employed Israelis with high education	26.6%	2015
Wage	Average monthly real wage per employee post – overall economy	10,006 NIS	FEB/2019
	Average monthly real wage per employee post – Israelis	10,275 NIS	FEB/2019
	Average monthly real wage per employee post – business sector	10,243 NIS	FEB/2019
	Labor productivity (net product per hour of work in the business sector)	144 NIS	Q4/2018
Foreign Direct Investments	FDI inflows	18.169 billion USD	2017
	FDI inflows (% of the GDP)	5.143%	2017
	FDI outflows	6.153 billion USD	2017
	FDI outflows (% of the GDP)	1.742%	2017
International Trade	Exports of goods and services	103.293 billion USD	2017
	Exports of goods and services (% of the GDP)	29.239%	2017
	Imports of goods and services	97.369 billion USD	2017

	Imports of goods and services (% of the GDP)	27.562%	2017
	Free Trade Agreements	EU, EFTA, MERCOSUR, USA, Turkey, Mexico, Canada	
Government Deficit	General government deficit (% of the GDP)	-2.1%	2015
	Average general government deficit (% of the GDP)	-3.7%	’09 – ’15

Source: Personal elaboration from the Bank of Israel data, 2017.

The Bank of Israel Research Department usually presents its forecasts over the macroeconomic changes for the next years. The most important variables it focuses on are the GDP, the inflation and the interest rate and these are assessed through the use of the Dynamic Stochastic General Equilibrium model that provides a support to analyze the forces affecting the economy.

List 2: Macroeconomic forecasts for 2019 and 2020.

Economic Indicators	2018[4]	Forecast 2019	Forecast 2020
GDP	3.3	3.2	3.5
Private consumption	3.9	3.0	3.0
Fixed capital formation	1.4	3.0	-2.0
Public sector consumption	3.5	3.5	2.5
Exports	4.4	4.0	6.0
Civilian imports	4.9	3.0	0.5

[4] National Accounts data, Central Bureau of Statistics.

Unemployment rate (average) (25 to 64 years old)	3.5	3.7	3.7
Inflation rate[5]	1.1	1.5	1.6
Bank of Israel interest rate (end of the year)	0.25	0.5	1.0

Source: Personal elaboration from the National Accounts data, 2018.

List 3: Estimate of the inflation and interest rates and their comparison.

Criteria	Bank of Israel Research Department	Capital markets	Private forecasters
Inflation rate (range of forecasts)	1.3	1.1	1.3 (μ 1.0 to 1.7)
Interest rate (range of forecasts)	0.5	0.4	0.5 (μ 0 to 0.75)

Source: Personal elaboration from the Bank of Israel data, 2018.

The main risk related to these forecasts regard the risk of downward of the global growth and trade. There should be considered the trade wars among developed countries and the advanced countries' uncertainty over the fiscal policy. The governmental choices are also deeply affecting Israel's growth and inflation rates as well as the increasing competition, the exchange rates and fiscal adjustments.

[5] Average Consumer Price Index reading in the final quarter of the year compared to the final quarter of the previous year.

1.4. The digital transformation[6]

Technology is usually accompanied with a certain level of potential for market disruption. But to do so, technology should not be taken as it is in its pure essence: it needs to be linked to humans and human-centered subjects and so to emerging trends in the business field or in the social and physical sciences in order to produce an unexpected transformation. The intersection between technology, sciences and business is usually the right way to develop digital transformation and make it measurable, concrete and achievable.

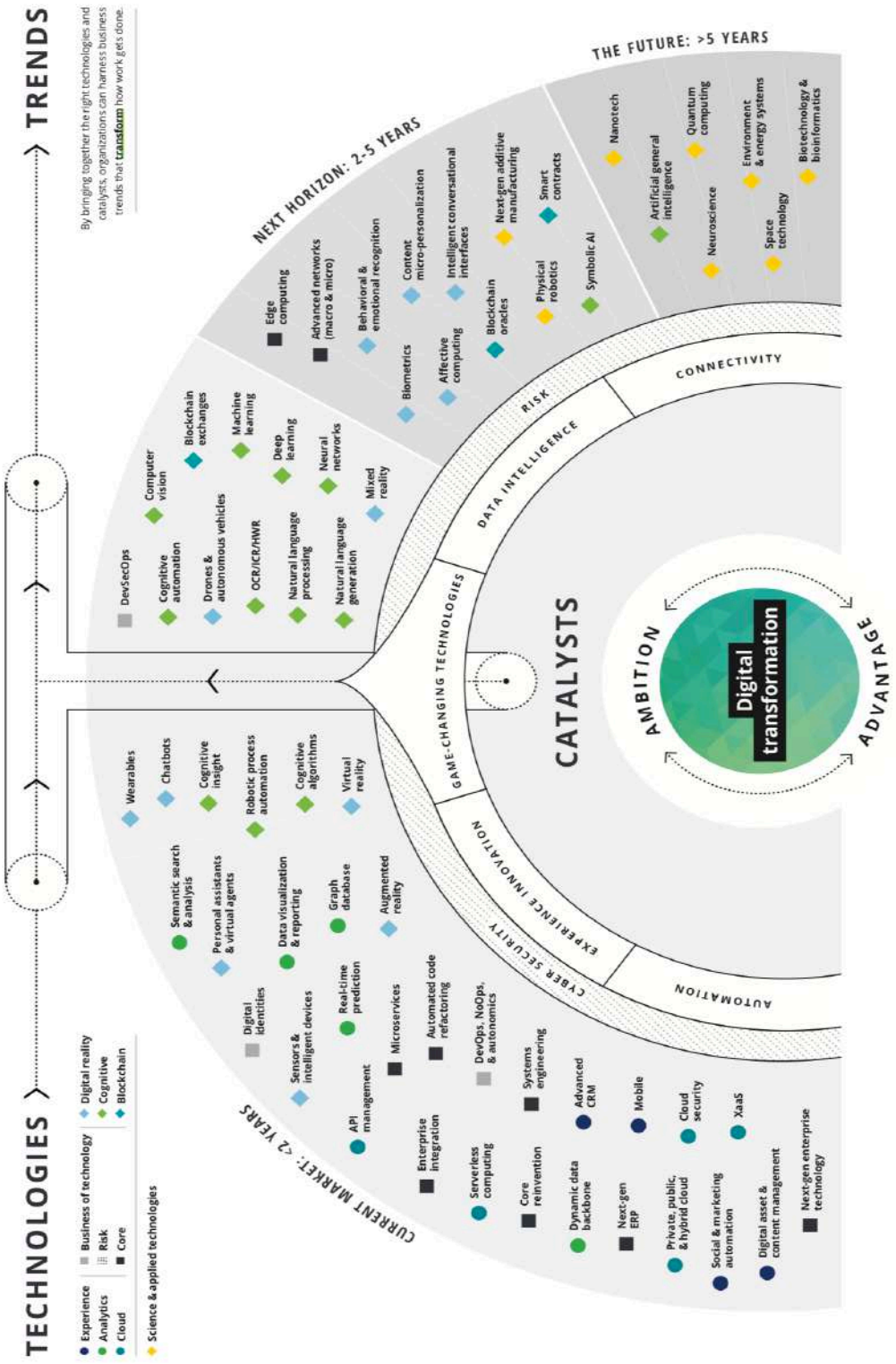
Nowadays, digital technology is everywhere. It affects many different subjects such as business, geography and culture, and it is also used for personal matters such as scheduling appointments and for entertainment. The word *digital* is used in many different acceptations, depending on the references. Looking at the corporate level, it usually refers to all the strategies using innovation to create new opportunities; while looking at the IT sector, it is linked to specific technologies. Digital can also be interpreted as the use of emerging and disruptive technologies to reconstruct the whole business. What if we consider together digital and transformation? This turns out to be the process allowing the organizations to resist and stand in the future. Everything starts from the leadership and its willingness to reach new objectives and goals, inside every kind of company, considering both the size and the industry.

At the heart of digital transformation there is always technology, but this is not the only driver to focus on. There are some instruments – catalysts – able to fasten and to amplify the reactions:

[6] The information related to innovation and Innovation Authority is based on data and information reported in the Global Innovation Index 2018 (11th edition) by Soumitra Dutta, Bruno Lanvin and Sacha Wunsch-Vincent, for the digital transformation (paragraph 1.4) and the global overview on innovation (paragraph 1.5).

- Game-changing technology: composed by product, operational and information technology that together form the supporting column of the organization.
- Experience innovation: this means taking a human-centric approach to reimagine and design the experience with all the stakeholders.
- Real time data intelligence: this helps companies to analyze different and contradictory flows of data and elaborate critical insights.
- Connectivity: a pattern based on the creation of a borderless ecosystem between different industries, the government and the market sectors in order to create value.
- Automation: as a consequence of the blurring line between humans and machines, firms need to transform the skills and the competences needed, but also to determine which are the alternative ways to reach the desired output.
- Risk: this considers all the external factors affecting a company such as the regulations, the financial and operational risks, the macroeconomic forces, the social and ethical priorities.
- Cyber security: a way to protect intellectual properties and information related to customers and employees through vigilance systems.

Figure 7: Digital transformation network.



Source: Deloitte Insights, Tech Trends 2019.

1.5. A global point of view

Nowadays, the world is plenty of new disruptive technologies and innovations with an incredible potential. And these are not just trends: the projects bring with them a number of great opportunities that could also lead to the birth of new industries and enterprises, not just in the information technology (IT) field but also as a component of the corporate strategy.

Digital, clouds and analytics have an incredible potential and value, but they have been surpassed by other emerging technologies and trends that modernize the companies by the inside and the industries enlarging their boundaries. For example, nowadays the most interesting trends are cognitive technologies, such as robotic automation, language processing and machine learning, digital reality, such are augmented reality (AI) and virtual reality (VR) that are modifying the way people interact with each other and with the surrounding, and blockchain, from bitcoin to trust. In such a changing environment, the IT need to disrupt itself to lead to strategic decisions.

We can identify nine forces that have been developed in the last ten years and that are currently shaping the future tendencies. These forces can be divided in three groups representing three different stages of the development, from the very beginning to a wider adoption, to then end with a more proactive perspective towards shaping the future:

- Digital experience. This means all the interactions and connections among people and organizations and the digital environment in which they are embedded: the focus was over the level of engagement such innovations could create and then improve, and so on a human-centered business strategy, in order to provide meaningful experiences and give great memories.
- Analytics. Data, numbers and algorithms are not just able to describe what happened and what is happing right now, but they also allow people to make predictions and try to anticipate the future: they have the potential to become foundational forces able to create automatic moves.

- Clouds. It is usually considered as one of the pillars of innovation that moved from being a low level of technology to be a driver of the transformation of single companies and entire businesses. It should not be considered as a mere extension of data collection, but a way to build products and services in an innovative and future-centered way.
- Digital reality. It usually comprehends different innovations such as virtual and augmented reality, internet of things (IoT), mixed reality (MR) and immersive technologies. Here, the devices assumed a secondary importance since the focus started to be over the experiences and the interactions.
- Blockchain. The forecasted spending over this tool is set to 9.7 billion USD by 2021. It allows to develop specific devices working for the enterprise as something precise and with specific characteristics, avoiding more complex databases.
- Cognitive technologies. These technologies help people to discover and deepen aspects that conventional and common wisdom would not be able to consider. Moreover, cognitive instruments allow to augment human reactions and to create automation related to the proper action to be taken: this usually flashes human mind, making people more active and into questioning, and bypasses the manipulation of the findings.
- The business of technology. Technology-driven changes and innovations bring with them the need to reorganize the enterprises and their needs. Companies are modifying their budgets and shifting their efforts from traditional tasks to IT-centered ones, even though the differences from these two categories are blurring.
- Core modernization. It involves all the strategies companies are implementing in order to build and create a new set of Enterprise Resource Planning (ERP). There is a bundle of implementable strategies that could be followed, such as replace, revitalize, re-platform, remediate and retrench.
- Cyber risk. Cybersecurity is becoming fundamental all over the world, in all kind of companies and at all the organizational levels and sectors and it should be

related not just to IT but embedded in the organizational strategy, policy and mindset, in order to discovers the gaps and recover them.

Figure 8: Global leaders in innovation in 2018.

Source: The Global Innovation Index, 2018.

List 4: Innovation leaders grouped by looking at the income level.

Low income (under 1,005 USD)	Lower-middle income (1,006 – 3,955 USD)	Upper-middle income (3,956 – 12,235 USD)	High income (above 12,236 USD)
Tanzania	Ukraine	China	Switzerland
Rwanda	Vietnam	Malaysia	Netherlands
Senegal	Moldova	Bulgaria	Sweden

Source: Personal elaboration from the Global Innovation Index, 2018.

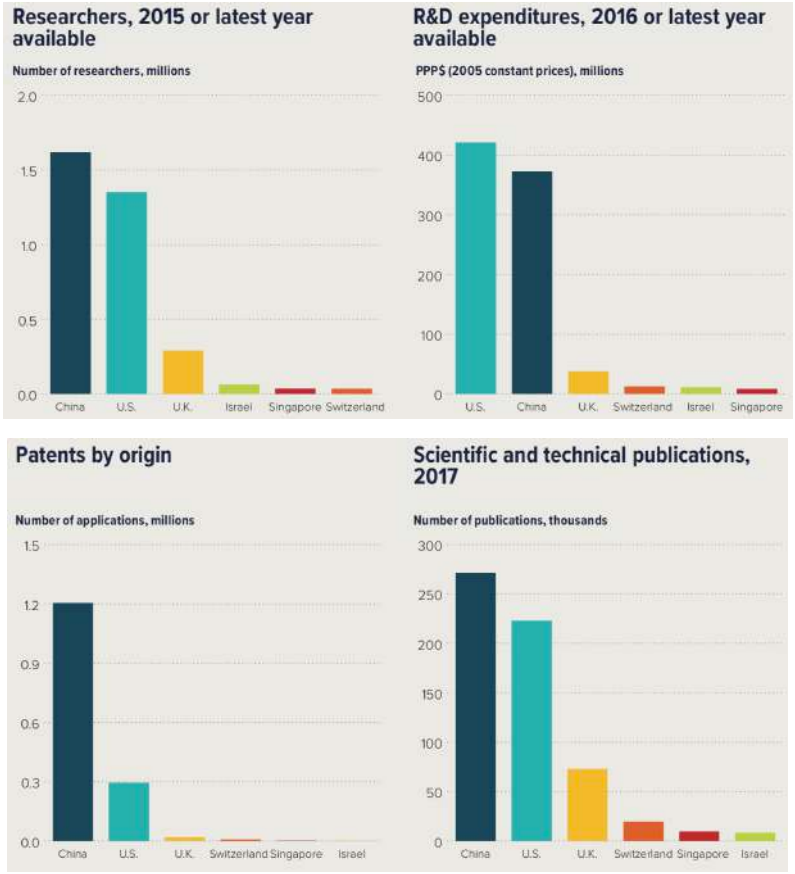
1.6. Key findings

The global innovation growth can be summarized in seven key findings that help to express the worldwide situation over the performances related to innovation:

1. A generalized optimistic feeling. After the worldwide crisis in the biennium 2007-2008, investments on innovation and R&D are growing slower than before in both public and corporate sectors but, besides this general scenario, the investments over certain fields such as education and human capital are globally growing. Intellectual property is growing mainly in China, reaching new levels never reached before.
2. Investment in disruptive innovations. This means using resources for both technological but also non-technological innovations.
3. Middle-income economies push. A huge gap between different economies still exists, but the push of powerful nations – such as China – can help developing economies outperform their growth's level, being an example to them. We can already see this phenomenon looking at the situation of South Africa, Mongolia, Madagascar and Georgia for example.
4. Diversification to drive the growth. It is not relevant how big is the country in order to evaluate its ability to drive the changes: it is usually more meaningful to investigate how diverse its businesses are. So, both large and small countries could have an impact over the general growth, even if diversification is more likely to happen in large countries.
5. From investments to results. There is not always correspondence between the wealth of a country and its level of expenditure in innovation: most of the countries have a linear relation, while others don't.
6. Imbalances blocking human and economic development. US, Canada and China are the greatest contributors to researches and publications, R&D expenditures and patents. According to Europe, there are lots of discrepancies related to the different regions and states but, despite this, most of the top economies come

from Europe. While Asia and Oceania are following, showing the most progresses.

Figure 9: Large high-income economies and upper-middle income China overshadow small countries in absolute innovation performance.



Source: Global Innovation Index 2018.

7. Top science and technology clusters. Here are considered both patent filings and publishing activity of every country: the top innovative ones are Tokyo, Shenzhen-Hong Kong and Seoul, but there are also new entrants such as Teheran and Moscow.

CHAPTER 2

THE ISRAELI INNOVATION AND THE EDTECH WORLD

2.1. The Innovation Authority program[7]

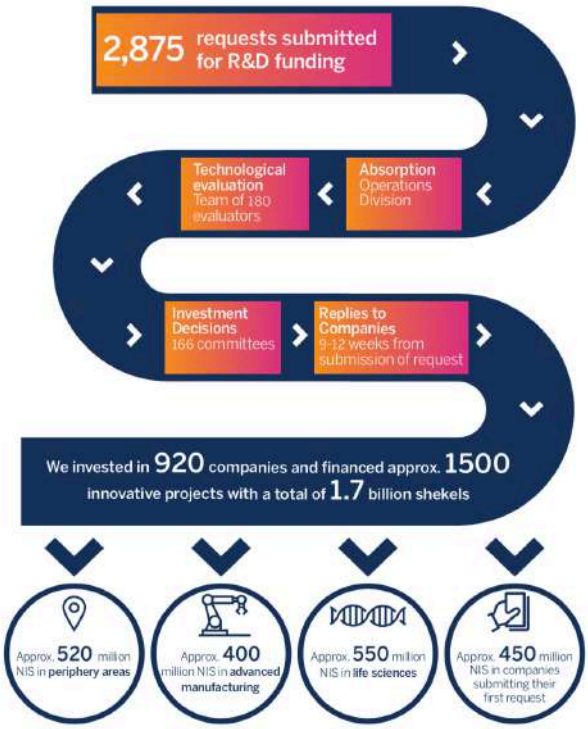
In the last years, Israel showed itself as an incredible pool for the hi-tech industry, becoming increasingly one of the most energic places to develop innovation because of the skills, capabilities and competences of the population and the entrepreneurial spirit. Even though 2018 was an animated year for innovation at a global level – for the trade wars and the new American reforms – for Israel the situation was highly different: to the top sectors of the country such as, for example, cyber and medical devices, now we can add Artificial Intelligence and FinTech.

The focus of the government and the most important forces with decisional power is to transform the country from a startup nation to a smart-up nation and innovation should be the engine of this evolution. There are mainly four aspects to be considered: the technological, the geographical, the demographic and the depth ones. Last year, 70% of the total high-tech investments were in Information and Communication Technologies (ICT) field and the 77% of the startups were operating in the Israel's central area.

The Innovation Authority willingness is to create a country that could become a leader in the innovation of the future and in entrepreneurship, but this requires Israel to invest in R&D, human capital and research infrastructures.

[7] The information related to innovation and Innovation Authority is based on data and information reported in in the Israel Innovation Authority's paper about innovation in Israel for the biennium 2018/2019, for the specific analysis of the Israeli current situation and development.

Figure 10: The activity of the Innovation Authority in 2018.



Source: Innovation in Israel Overview 2018-2019.

The Innovation Authority, together with the Authority's Council composed by representatives of the Ministry of Finance, the Ministry of Economic and Industry and others of the public and the industry, have written ten strategic objectives for the period 2018-2022, that can be grouped in 4 categories:

1. Technological leadership: fastening the development of new communities and ecosystems; progress of the leadership in future technologies; combination of efforts to improve the skills of the human capital; assistance to innovative startups to make them grow.
2. Economic impact: improve the impact of multinational corporations and their R&D divisions; contribute to the growth of complete technological companies.
3. Competitiveness and productivity: augment productivity through technological innovation; support competitiveness in the manufacturing sector.

4. Social and economic return: encourage the development of the periphery in technological terms; position Israel as an Impact Innovation Nation providing solution to societal questionings.

The implementation of each objective is assigned to different divisions inside the Innovation Authority body, each one with a specific task and budget.

The Technological Infrastructure Division is responsible for the development of new knowledge, for its transfer and for R&D in general. In 2018, almost 300 million NIS[8] were given the department as yearly budget that, in actual terms, can be translated in a number of new national and international collaborations and implemented programs. All the project implemented are aiming to transfer the knowledge from the academic world to the industrial one, creating a bridge among researchers and companies: in this scenario, international linkages are fundamental in order to accelerate the development of the innovation and technology industry in the country. For example, the division started a collaboration with the CERN (Switzerland), with Europe for researches over the quantum technologies and with German companies for funding Israeli companies working on nanotechnologies. There are other sectors involved too, such as the food technology industry and the advanced manufacturing one, mainly focusing over industries with a low innovation rate.

The Startup Division is a support to new-born companies over the product development, the sales and raising capital and funds. Through the programs developed by the division in 2018, 5 innovation labs and 19 incubators started to operate in Israel in different fields, 73 entrepreneurs obtained support and 213 startups received a total amount of 400 million NIS[9] as support. The most important labs operate in infrastructure and construction, manufacturing, food tech, smart transportation, fintech, advanced materials and cyber security, even in smaller and less developed Israeli cities such as Be'er Sheva and Tzfat, aiming to spread entrepreneurship in the peripheries too.

[8] New Israeli Shekel. The equivalent of 300 million NIS is 78.7 million euros and 86.2 million US dollars (proxies 2nd October 2019).

[9] It means 104.9 million euros and 114.7 million US dollars (proxies 2nd October 2019).

The Growth Division's last year budget was 721 million NIS[10] and its aim is to help startups reach a sustainable growth and mature companies develop a technological power through pilot funds and R&D funds. The division helped almost 260 companies providing them support, making them raise funds and conducting pilots over their products. The programs are directed to very diversified fields such as environmental protection, cyber security, energy, agriculture and digital healthcare, but the main focus are allowing companies to grow as full companies in Israel – and then enlarge their boundaries and reach foreign countries too – and creating R&D centers inside the country in order to enable companies invest in Israel to develop innovative and disruptive technologies (large and mature companies' investment grew by 40% from 2017 to 2018).

The Societal Challenges Division is mainly focused over improving the capabilities of the human capital about the high-tech field and supporting the development of technological entrepreneurship. With a 79 million NIS[11] budget for 2018, the division implemented more than 70 innovative projects with different aims: it organized boot camps in order to train new people and retrain specialists and skilled personnel to develop new high-tech jobs; it created collaboration with governmental entities such as the Population and Immigration Authority, the Ministry of Labor and Social Affairs and the Ministry of Foreign Affairs, to let foreigners and experts enter the country to work with special visas; it launched re-integration programs involving Israelis living abroad in the high-tech field, creating bridges among different countries and with companies and employers, and particular categories such as ultra-orthodox and other minorities.

The Advanced Manufacturing Division is specifically responsible for the manufacturing industry, its global development and the implementation of innovative processes. The last year budget – 125 million NIS[12] – was mainly spent for the so called MOFET initiative, created to push companies to try to reach technological advancements and to assimilate

[10] Equivalent to 189 million euros and 206.7 million US dollars (proxies 2nd October 2019).

[11] Equal to 20.7 million euros and 22.6 million US dollars (proxies 2nd October 2019).

[12] Correspondent to 32.8 million euros and 35.8 million US dollars (proxies 2nd October 2019).

innovations for improvements in the processes or in the products. The project was made accessible to all the companies, not just the more technologically developed ones but even the ones located in the peripheries and the ones with no experience in R&D.

The last division is dedicated to the International Collaboration, with a 104 million NIS[13] budget that, in 2018, helped more than 200 Israeli companies and entities receiving grants and financing. It also allowed the country to sign and establish a series of agreements with different countries such as India, Argentina, Thailand and the US, aiming at paving the way to new oversea pilots in healthcare, energy and agriculture, among the others.

For its nature, the Tech industry is meant to be increasingly global according to a wide range of aspects such as people, capital and outcomes (products and services).

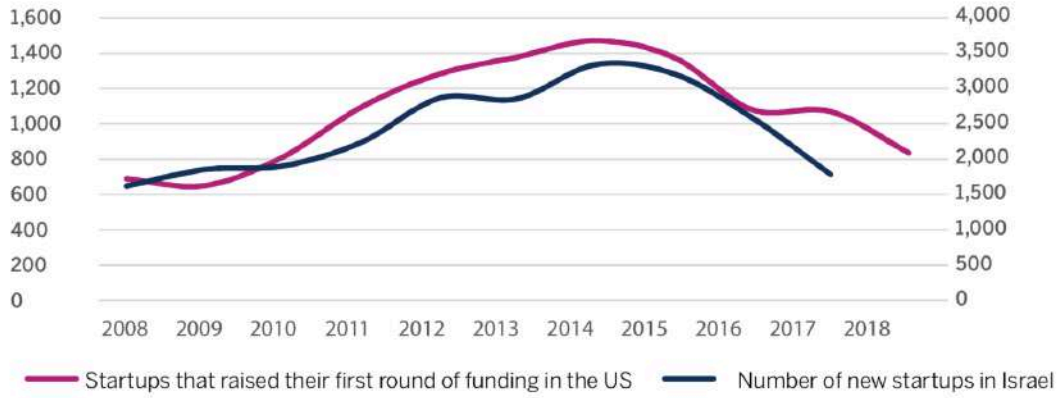
Even if the Israeli high-tech sector is quite small, the market is open and it has a good chance to become global, but there are governmental limitations setting new boundaries to this new borderless technological world. During the course of the last decades, the communications and the exchanges among countries – even far away – increasingly spread: nowadays, consumers can benefit from services and products offered by foreign firms in their home country and organizations can count on shared forces for the development of digital and innovative outcomes.

This positive environment for technological advances has been affected by a negative return related to regulation and taxation: in 2016, the Organization for Economic Cooperation and Development (OECD) enacted the BEPS (Base Erosion and Profit Shifting) guidelines in order to tax patents and intellectual properties directly in the country in which they have been developed, hoping to reach tax harmonization; in 2017, countries started to adopt these new principles and to adapt their tax environment to the technological one; in 2018, the Job Act reform and the Trump's Tax Cuts led to the issuing of BEAT (Base Erosion and Anti-Abuse Tax) and GILTI (Global Intangible Low-Taxed Income) taxes.

[13] That is 27.3 million euros and 29.8 million US dollars (proxies 2nd October 2019).

Specifically referring to the Israeli situation, the last years were characterized by an intensification of the improvement and the maturation of the ecosystem's progresses. The economic landscape in Israel is mainly featured by two distinct characters, specifically the mature companies and the startups. The macroeconomic indexes – considered in the period from 2004 to 2017 – such as the number of people employed in the high-tech, the high-tech output and the high-tech exports suggest a gradual growth of the group of established companies. On the other hand, the overall situation of the startup industry depended from the general economic situation. At the beginning of the last decade, the world was trying to recover from the crisis started in 2008 in the US and investors were seeking for high returns. This led them to strongly believe in the power of new and innovative companies that saw increased flows of capital towards themselves. This was the best ground possible for the flourishing of *unicorns* and so 1-billion-dollars-startups that have not yet issued the initial public offering (IPO). Since then, even though the startup world continued to grow thanks to the investments and funding rounds done – the capital raised in 2017 was 5.3 billion dollars, while in 2018 it reached 6.4 billion dollars – later the maturation trend is accusing a clear decline in early stages. New startup launches in Israel are declining because of a global shift in the interests and preferences of the investors: nowadays, they prefer to choose for winners in the very early stages and they usually decide to invest larger sums in a small number of high-tech startups, making the environment pretty competitive.

Figure 11: New startups in Israel and first round funding in the US from 2008 to 2018.



Source: Innovation in Israel Overview 2018-2019.

Since the growth rate of startups in Israel stays quite high and the competition with other firms constantly grows, these companies need to recruit skilled and specialized personnel at a fast rate: human resource management is becoming a competing ground too, especially against multinational enterprises expanding their operation and businesses in Israel. The government is trying to help companies seeking for skillful employees by opening the market to university students involved in high-tech and managerial subjects, by establishing extra-academic paths, by allowing foreign people move in the country and by making young people and new generations focus on math and other scientific courses. It is trying to encourage students to attend master's degrees and doctorates (PhD) and it is also making a big effort towards the inclusion of women and underrepresented populations living in the country, such as Arabs and Ultra-Orthodox. For example, the 26% of the whole bachelor's graduates in 2017-2018 was involved in computer science and engineering; the student body is now made up of 10% of Arabs; coding boot camps enlarged the training in the array of high-tech professions; the government created the so called green track in order to attract overseas talents and professionals.

Due to the spread of AI and the overall digitalization process, one of the most important fields asking for skilled human capital is data science: from 2012 to 2017, the industry grew by 650% and this reflects the current economic situation. The field of communications is now in a delicate phase of significant decline, classic Information and Communication Technologies are reaching a saturation point, while disrupting technologies – such as AI, Industry 4.0, blockchain and robotics – based on the digitalization process are rapidly growing and evolving, leading to the creation of brand new fields like digital health, precision agriculture and smart transportation. Moreover, digitization is blurring the boundaries between low-tech and high-tech, making firms in need to follow the changes in how business in made and in the application of technology in order to be competitive and prevent the innovative startups' windward. Large and historic companies and corporations must adapt to these changes, follow the innovation flow and be ready to understand and implement emerging technologies. In recent years, corporation are trying to find out the best way to integrate innovative ideas either

external or internal and to reach new markets in an increasingly institutionalized landscape. There are different ways of doing so: some firms are investing in technological innovation inside the firm itself, others are acquiring tech companies and others again are directly collaborating with startups in a number of different industries. The late 20th century was mainly characterized by a huge digital revolution based on the spread of universally accessible digital data. The foundations of such a revolution lay in three technological and innovative waves that help to understand the actual Israeli situation as a meeting point of its innovation policy. The first wave is called wave of computability (1940-1970) and it is based on the computers' ability to save data and perform fast and tricky calculations and the development hardware boosting productivity and software for the end users. Then, there was the wave of connectivity (1980-2000) that has at its core the internet and the increased linkages between people around the world with the creation of a global community, browsers and social media. The last is the wave of mobility (2010-2030) based on the power of smartphones and mobile devices and key technologies such as cloud computing and GPS. The peculiarity is that each wave is based on the preceding one: the result is that nowadays people in industrial countries are in motion, with devices connecting them to other people around the world and with the possibility to have access to human knowledge. The power of the waves is gradually slowing down and reaching saturation, but the link between them is creating a consequence: the amount and the volume of data created thanks to use of internet, together with the devices used accordingly, are moving the interest toward machine learning that can be seen as the foundation of the next wave in technological revolution.

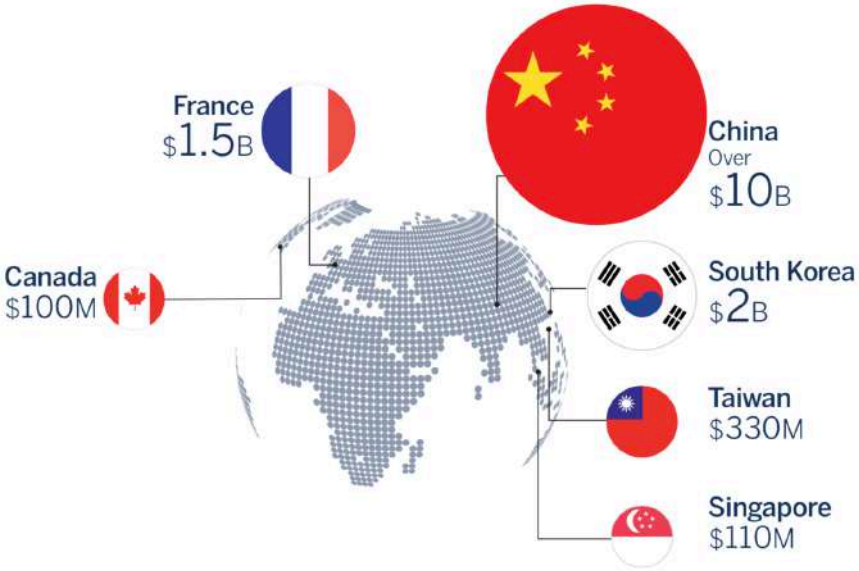
Alan Turing in 1950 was the first scientist posing the question "can machines think?" in one of its papers. This question found an answer in 1956 during a seminar at Dartmouth College when the term Artificial Intelligence (AI) was first used to describe the machine ability to encourage human intelligent behaviors. At the beginning of this decade, scientists found out that, combining together computational skills and the huge amount of accessible data, could produce impressive results: machine learning algorithms started to complete smart tasks – such as object recognition. AI differs from the other

disruptive technologies because it is based on the main quality of human being that is intelligence. This provoked two different sets of feelings: on one hand, the optimistic side sees AI as a tool to overcome human limits, to reach advancements in different fields such as agriculture, transportation and health and to let people free to express themselves in the tasks requiring empathy and creativity; on the other hand, the pessimistic side underlines terrible scenarios such as the destruction of the human race, computers taking over the world and replacement in many different tasks that would create a widespread unemployment.

We need to point out the natural human tendency to overestimate technology's effects in the short run and to underestimate the ones in the long run. The future wave will be probably led by smarter machine and focused on Internet of Things (IoT), big data and machine learning: the next wave would be based on creating connections between different machines, allowing them to develop an increased autonomy and a greater ability in decision making. Each improvement in this direction brings an incredible economic value, allows companies to tremendously increase their profitability and places them in a leading competitive position.

As of late 2018, almost 20 countries worldwide expressed the relevance of the race for technological dominance, announcing the development and the implementation of an AI national strategy and investing billions of dollars in it. In order to avoid competition and to try to be among the first countries, they are mainly investing long-term in infrastructures that will later facilitate the implementation of the technologies. This is a matter of regulation and human capital too: since decisions are taken by non-human entities, there should be ad hoc rules, norms and legal frameworks and also new system to manage the coexistence with humans in terms of soft skills, capabilities, problem solving and emotional intelligence.

Figure 12: Massive investments in AI all over the world (millions and billions of US dollars).



Source: Innovation in Israel Overview 2018-2019.

In developed countries, governments are working in order to reform the educational system to make young people improve their knowledge and expertise in science, technology, engineering and mathematics (STEM) – for example, in 15 European countries coding has been already added to the standard curriculum.

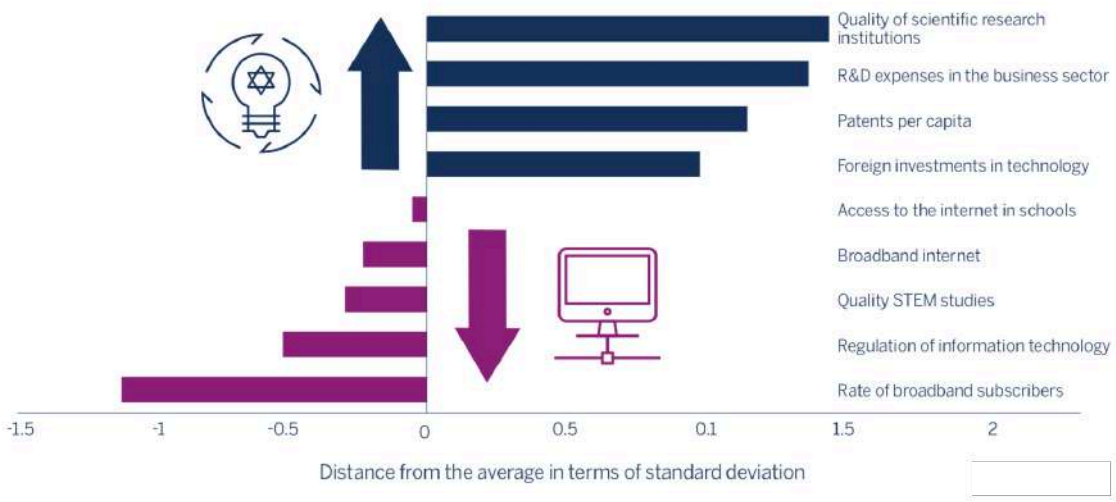
In this scenario, Israel covers a top position, thanks to the great level of development in both communication fields and coding ones, that allow it to take advantage and benefit from internet developments. Moreover, in last two decades thousands of startups based on internet and mobile platforms were born and established in the country, making it the perfect ground for innovative firms in the tech market. The bundle of past successes made Israel and its ecosystem of innovation the leading AI innovative wave. Even if history teaches us that being a leader in technology usually lasts for a little period of time – this was, for example, the case of Japan that was a superpower in tech and electronics between 1970 and 1980, but then it missed the connectivity wave in 1990 – the Israeli government and policy makers have been able to create the best landscape to recognize the potentialities of an innovative based industry and to deal in real time with technological challenges and improvements, focusing on specific fields, such as

technological incubators and entrepreneurship, and programs, like the MAGNET that manages the collaboration between academic and commercial programs. However, the country is losing power because of the increased competition in the field of technology: in order to maintain the leadership, resources need to be correctly allocated, the right tools need to be developed in advance and each sector needs to establish a specific strategy and vision related to the whole Israeli economy. First of all, the country should aim to strengthen the AI's infrastructures and building excellent university and academic systems. As a consequence, the focus would shift on improving the quality of the human capital required: senior researchers must be retained, experts and professionals are the fundamental link between the industry and the higher educational fields, workforce must be trained to reach higher level of specialization and an increased number of people with good skills in data science. In the end, the government should focus on R&D and its infrastructural development, on sharing data and making them accessible and on encouraging open innovation for multinational tech companies. The maturity and the sophistication of the Israeli innovation system allow the country – despite the small size – to be a global winner in computability and in security, to reach outstanding results in entrepreneurship and innovation and to be one of the headquarters of the evolution of the high-tech: considered all together, these specifications set the country in the right position to be ready for the next wave and be a main character of it.

Despite Israel's ability to establish itself as a global innovation hub, the country is facing a significative internal problem: the gap among the high-tech industry on one side and the daily life on the other one. A copious portion of the population do not feel the technological proficiency level of Israel, while do feel the lag against the Western World. If the development and the creation of innovation are a flagship of Israeli economy, the consumption and the assimilation of such innovation is proving to be quite problematic. An example of this discrepancy is the transportation sector: if we compare Israeli companies that developed apps, products and services such as Moovit, Mobileye and Waze used all over the world, to the transport solution offered to the population, we easily find out that the latter are very limited. Right now, Israel need to break through the boundaries of the highly technological industry and try to disrupt the day-to-day life

in order to expand the accessibility of innovation to its population as a whole and transforming the so called startup nation in a smart-up nation able to implement technological excellences in all the aspects of life and to stimulate the creation of new enterprises, businesses and industries.

Figure 13: Israel positioning in selected innovation indices in the period 2017-2018.



Source: World Economic Forum, 2018.

The dualism of Israeli economy is mainly caused by the competition in the business sector in general and by the internal regulatory environment. The generalized weak competition – if compared to the global leaders – inside the country is hindering its investments towards innovation and the consumers' access to advanced products and services. In addition to be a very small and isolated country, Israel's economy can be considered an island economy characterized by low exposure to global competition and a far positioning from global supply chains because of the little feasibility in launching operations in the country. As a consequence, there are no economic incentives for either new or foreign competitors to enter the Israeli market because of the non-tradability of sectors like banking, infrastructure and communication. The regulatory environment affects the adoption of innovative solutions too: competitors depending on technology are either blocked from entering the market or unable to provide their products or

services inside the country – let's think, for example, about the legal services or the provision of vital utilities like electricity and water.

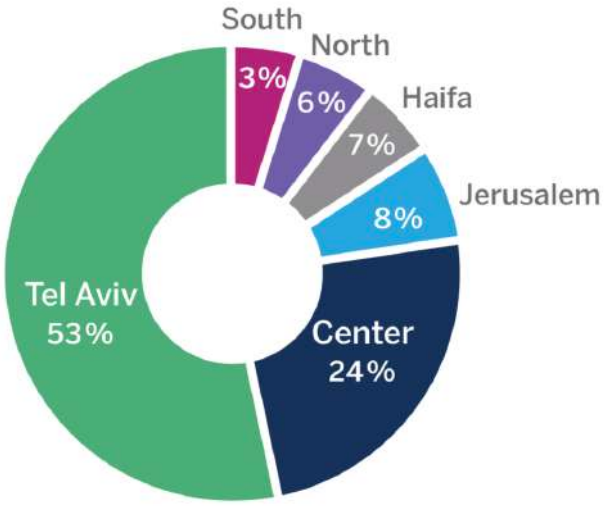
But the current internal situation is gradually changing: the geographical distance is getting smaller, making Israel evolving from an isolated land to an active member of the global competition thanks to the increased level of automation and digitalization of a broad range of services and products – such as newspapers, books and financial services; the supply of tangible products is undergoing a radical transformation in the business models characterized by online offers, low shipping costs, home manufacturing and autonomous delivery; innovative startups are increasingly penetrating highly regulated fields such as banking and public transportation, making the rules weaker and weaker; people are asking for an improvement and a renovation of the public sector, including the vital service one, such as a more efficient train transportation, a lower traffic congestion and a fairer vital services' management. It is clear to the government that the gap is no more sustainable and must be bridged in order to create a new innovative and smart economy, aiming to make Israel part of the global leaders.

Today, the regulatory activity and its inadequacy, the lack of governmental coordination and the obsolescence of the mechanisms used to create a connection with the business world are the main limitations that need to be overcome: policies life-cycle is valued from 5 to 20 years – while in just half a year a startup can turn into a global reality – and the barriers crate stagnation and shrink collaboration and communication. Anyway, there are a bundle of strategies that the Innovation Authority is setting in order to affect the change. First of all, the government is trying to encourage the collaboration between the small businesses and the high-tech companies in order to boost the first and to improve the starting point of the latter. Then, a number of ministries are pushing for collaboration with the Innovation Authority body to support the development of technological innovations in their sector. Government regulation is changing, aiming to balance out public protection, market fairness and innovative advances, taking into account the evolution of both business and human activities due to technological progresses. For example, the Ministry of Transportation is opening up to autonomous vehicles testing; the Ministry of Justice and the Ministry of Finance are testing a trial and

error environment for the financial technology sector (FinTech) that allows to assess products, services and business models without the complete adherence to the regulatory requirements; the Ministry of Energy is setting standard to improve the penetration and the implementation of renewable energies and reduce the pollution, giving incentives for the use of electric vehicles. In order to reach an advancement in the regulatory field to foster innovation, Israel is now joining the Center for the Fourth Industrial Revolution (C4IR) aiming at creating and sharing the best practices for new regulations over innovation, looking at the future development too.

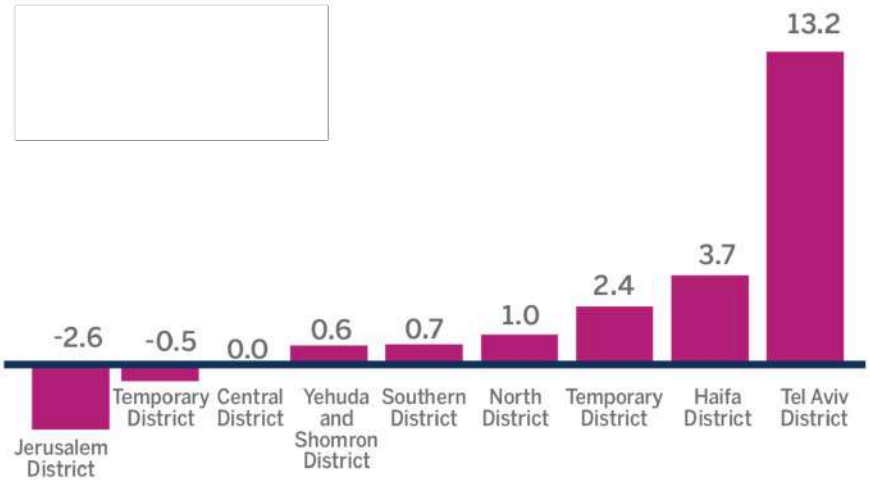
Observing Israel as a whole, we can easily find out substantial geographical differences between the metropolitan areas and the countryside. High-tech companies usually prefer to locate and concentrate in specific geographic areas nearby metropolises – think about San Francisco, Beijing and London, for example. the centralization trend is a characteristic affecting Israel too: almost 80% of the jobs related to the high-tech sector are located in Tel Aviv and the central region of Israel. Such scenario brings advantages such as positive externalities, circulation of human capital and investors' interest, but consequently disadvantages too: the growth and the development of the country is not spread throughout it but it is concentrated in closed areas that become magnet for entrepreneurs, talented people, money lenders, subtracting such resources to the other areas. Nowadays, in the north and the south parts of Israel, there is a greater concentration of manufacturing, agriculture and food industries due to the high availability of low-cost lands that allows a high level of specialization. The main problem of this situation is related to the absence of linkages and connections among city centers and peripheries that inhibits the spread of innovation all over the country. This brings other gaps too: there is a quite huge productivity imbalance, followed by a disparity in salaries – wages in the countryside are almost 35% lower than the average of the ones in the central areas, mainly because of the differences in the industries, while the ones of the Tel Aviv district increased by 70% from 2015 to 2017 – and in the presence of high-tech skilled employees – since the ones living outside the metropolitan areas have lower odds of obtaining a high-tech employment.

Figure 14: Startup concentration per district in 2018.



Source: Innovation Authority, 2019.

Figure 15: Salary growth in the high-tech sector per district from 2015 to 2017.



Source: Startup Nation Central, 2018.

In recent years, the Innovation Authority started programs to develop the peripheries and to make companies in such areas grow through a system of grants, opened incubators operating in these areas and sustained high-tech companies opening development centers with benefits: the total amount allocated for the progress of R&D

outside the Tel Aviv district is about 143 million dollars[14]. Favoring entrepreneurship and technological innovation should be the mean through which strengthening the economic activity outside the local centers and augment the quantity and the quality of the high-tech employment to refine the productivity of the peripheries and the salary's average. There are four central areas of interest to enhance during the next years in order to promote technological development all over the country:

1. The manufacturing industry and the agriculture and food sectors. For many years, the manufacturing sector was considered as a secondary industry in Israel, causing a generalized under-investment regarding technology and its inclusion in the processes. Conversely, the agriculture and food sectors have always been featured by the experimentation and the adoption of advanced technologies – for example, the OECD studies stated that Israel is the world leader in recycling wastewater from agricultural use and production. The implementation of innovation in the peripheries is hindered by the shortage of financing, networks and skilled personnel and so, consequently, investments in innovation are hampered. Since these days, the government has already allocated 120 million shekels[15] per year and it is constantly struggling for their participation to a variety of incentive programs, aiming at supporting such companies. It has also started to cooperate with local clusters in the Galilee and in the Negev, with applied research institutions and with technology entrepreneurs.
2. Local entrepreneurship. Nowadays, the 77% of the total of all-kind startups in Israel is located in the Tel Aviv district and in the other central areas. Building bridges among technological entrepreneurs and their communities and the local ones will help them succeed, figure out their potentialities, develop a high-quality ecosystem of employment and improve the quality of life. The government is stressing the importance of making children focus over science,

[14] It equals to 500 million shekels and to 129.9 million euros (proxies 9th October 2019).

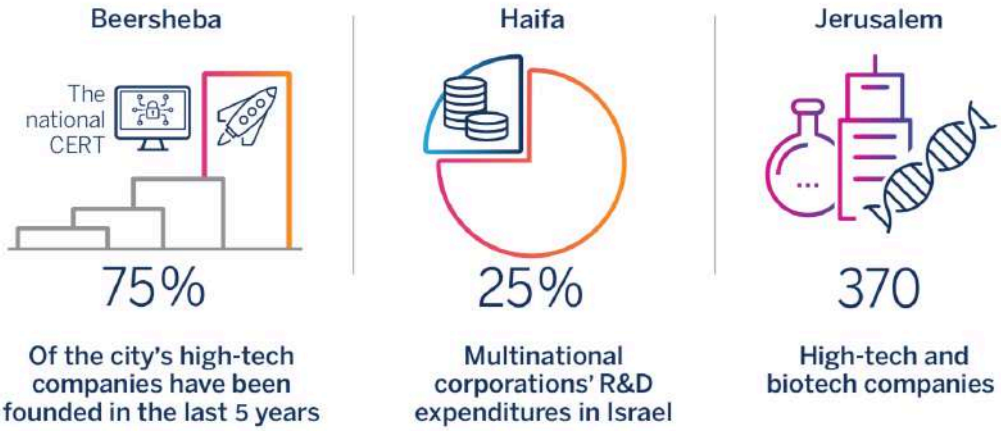
[15] That is 31.2 million euros and 34.3 million dollars (proxies 9th October 2019).

mathematics and engineering in order to create a new technological society and increasing the odds of growing a technological ruling class too; it is also trying to promote the establishment of startup incubators for the development of an innovative ecosystem.

3. Human capital and leading companies. The residents of the peripheries are increasing their educational level and, instead of presenting a preference in living in big city centers, they are confirming the human tendency of going back to the hometown after the academic education. The proximity to the family and the quality of life are the main reasons making people prefer living far from more technological realities and near to the places where they grew up – statistically speaking, only more or less 25% of engineering and science graduates move downtown and this tendency is greater looking only at the Arab population. Even if it may be difficult to find a high-tech job in the periphery, because the market is not mature enough, the government is giving benefits and incentives to companies establishing subsidiaries and production plants in the peripheries and organizing training programs for local talents.
4. Enlarge the ecosystem focusing on Beersheba, Haifa and Jerusalem. These three cities already possess the foundations for a technological development and the creating of a high-tech ecosystem: they have important universities, such as the Technion in Haifa and the Hebrew University in Jerusalem, efficient health centers, such as the Soroka hospital in Beersheba, but they have not reached their full potential yet. Haifa is the main Israeli center for R&D, many leading companies decided to establish in Jerusalem and tons of cyber and cyber security startups are operating in Beersheba – since the Cyber Directorate was founded there. The cities are fighting against problem related to municipal, infrastructure and educational innovation that make for them not possible to build a complete high-tech ecosystem. They are looking forward to promote new forms of entrepreneurship, to sustain higher education, to develop R&D infrastructures, to strengthen the connections within Israel. In order to do so, the government is working to make easier for incubators and startups to establish in the country

and activating program to stimulate entrepreneurship: millions of shekels have been allocated for innovation laboratories in the cyber-financial technology (Fin-Sec) field and Ministries and other national authorities are examining how to overcome the developmental obstacles.

Figure 16: The potentiality of the cities to develop a high-tech country.



Source: Innovation Authority, 2018.

2.2. The path to education technology

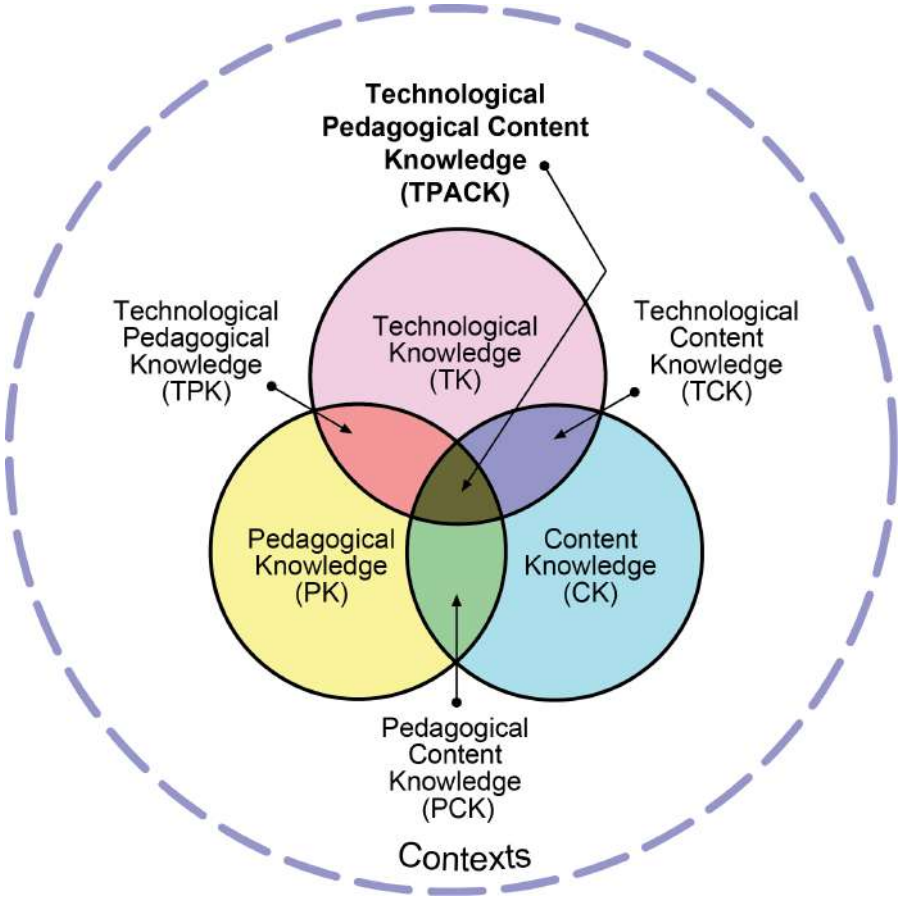
Progress and innovation are changing our world as never before, bringing disruptiveness in in a wide variety of fields. Information technology is the main driver of these flows of transformation that are not just changing our daily lives and the organizations, but they have a significative reflection on the learning and teaching habits too. The tech industry has increasingly brought its influence in the educational world, changing the basic approach to the processes of human work and turning the learning process into a bundle of increasingly personalized and interactive activities: information is now accessible to everyone, methods are less complicated and comprehension is boosted. The educational world is remodeling its basic frames thanks to the contribution of

technology that is giving birth to a brand-new approach to both the learning and the teaching sphere.

Overtime, the pedagogical principles became an integral part underlying the matters discussed inside classrooms, changing the former setting based on the centrality of teachers and educators simply transmitting their acquired knowledge to students. The great disruption of such habits came in the '80s with the PCK model – pedagogical (P) content (C) knowledge (K) – that was basically focused on the teaching processes and on the applicability of the pedagogical knowledge to the content knowledge: the aim was to find what to teach and apply to it the best teaching approach. It deals with the representation and the wording of pedagogical techniques, content, knowledge of the teaching strategies to foster meaningful comprehension and students' prior knowledge that is carried in the context. Generally speaking, knowledge is a complex process the brain uses in order to make connections among the different portions of what we have gained in all the learning experiences we went through (Shulman, 1986).

Then, in 2006, the model went through another development phase thanks to Mishra and Koehler who introduced technology as a fundamental element, since the presence of technology inside society became almost ubiquitous. It became increasingly clear that educators had to include technology knowledge to construct the perfect teaching environment for their students. This need gave birth to the model we rely on nowadays: the TPCK or TPACK model. The integration of information and communication technologies turned out to be fundamental to express the context's constant evolution and change over time, expressing the need for adaptation and transformation of technology knowledge.

Figure 17: Graphic representation of the TPACK model using the Venn diagram.



Source: Matt-koehler.com, 2019.

This vision puts together the three most important areas influencing education – technology (T), pedagogy (P or PA) and content (C) knowledge (K) – and the acronym typically refers to the type of knowledge teachers need to create technology-enhanced lessons and so to integrate technology in their lectures. The reciprocity among these elements created three basic relationships:

1. Technological Content Knowledge that is based on the interconnection between technology and content and includes aspects such as the ability to use database and collect data, the imagination of using technological tools for new purposes.
2. Technological Pedagogical Knowledge that includes how people teach with technological tools and so the integration and the implementation of

technology-enhanced activities in planning and designing the lectures and the explanation of how technology should be used.

3. Technological Pedagogical Content Knowledge represents the final relation coming from the intersection of the three elements. It basically represents the ability of teachers to include technology in their lectures and to use technology as a mean, to blend together tools and to apply the correct strategy in order to provide students with tech-enhanced learning experiences; at the same time, teachers must keep in mind students' struggles and already existing knowledge, being willing to create something new (Mishra and Koehler, 2006).

2.3. So, what is EdTech?

Technology is everywhere and it is increasingly permeating our lives and our culture because it is affecting how we work, play and learn. New generations are born in a digital world that is characterized by speed, instant and constant access to information, development of smartphones and augmented reality experiences. Digital natives have built and developed new learning habits overtime, showing differences from previous situations in terms of how they consume and process information. They established new learning styles and different problem-solving strategies to respond to new personal characteristics: they tend to have a very short attention span – for example, they typically switch from one app to another one in a few seconds – they prefer bite-sized content confined to a point, they search for and have access to content in a different way, they prefer engaging and rich multimedia content and they love to learn anywhere and anytime, mainly from their mobile devices. Inside classrooms, they perceive distance from the environment surrounding them and treat it as something limiting their instincts and behaviors. Keeping this information together, people should be led to increasingly include technology into the education system as a whole: classrooms should give them an experience and foster the sharing of interpersonal skills. Moreover, nowadays, people constantly search for information on their own thanks to their

smartphones – they do not go to the library store or at the desk to search from a computer – and, when they do not have it alongside, they feel disconnected. It turns clear that the implementation of smartphones and smartphone-like content is fundamental to sustain the required evolution in learning: kids and students are searching for engaging content, interactions, fun and attractiveness. So, we can address the lack of personalization as the biggest drawback in traditional education because classes are made of numerous students, each one of them having different characteristics, personality, abilities and backgrounds, and educators tend to treat them in the same way – same lectures, same homework, same tests – without focusing on needs, performances and progresses. In this context, technology can be a solution: it allows to renovate education with flexibility, designing a specific and personalized learning path for every single student, providing the right content to every need and making the same concept understandable to everyone – but in a personalized way. Moreover, it should not be a substitute, but an enhancer of the work that is done by teachers and educators who are in charge of creating an environment able to fulfill the learner and to fit with their needs and expectations (Sudhindra, 2018).

In this way, education technology should not be treated as the mere implementation of electronic devices and online tools in the learning process: instead, it is concerned with designing a true learning experience following the time we are living in because technology has always been part of education whether it was a writing instrument or a smart blackboard (Dey, 2017).

Figure 18: EdTech word cloud and the most meaningful words related to the field.

Source: Medium.com, 2017.

EdTech, also known as EduTech, is a sector engaged in investigating the process of analyzing, designing, developing, implementing and evaluating didactics, learning and teaching: it is about the use of the best technological tools and processes in order to reach advancements in the learning sphere, aiming at improving education (Kurt, 2015). The name comes from two words, education and technology. “Education” is the process of knowledge and culture transmission to people in the developmental age from both natural institutions – such as family and nation – and specific ones – like schools and educational centers. It is the act of teaching and acquiring new knowledge, developing judgmental power and intellectually preparing others for mature life. The reasoning over educational phenomena is called “pedagogy”. “Technology” means the use of knowledge to create something new that has an impact on life, environment and society. It is not about objects, but it comprehends the development of tools and machines to make daily life better off and to bring disruptiveness changing societies, traditions and cultures (Treccani, 2020).

EdTech can have a number of different meanings and can involve a wide variety of things, such as digital tools, media, learning management systems, data privacy and security, information and communication technologies and tech infrastructures. At MindCET, for example, researchers think that EdTech means bringing entrepreneurial

and startup culture inside the world of education and thinking about it as a loop process that never ends – an exchange between the two fields as a continuum.
There are three learning theories related to educational technology and to how humans learn. Each theory focuses on a precise aspect of the learning experience, but all of them are focused on the fact that EdTech should facilitate learning:

1. Behaviorism. The basic assumption highlighted is that all behaviors are acquired through conditioning. Moreover, operant conditioning regards the aspect of learning specifically based on stimuli creating a response and then leading to other stimuli. It was found that these processes allow students to increase their performances.
2. Cognitivism. This learning theory is focused on the mental process regarding how information is received, stored and retrieved overtime by our minds, aiming at helping people to understand and remember things. This involves visual, auditory and multimedia tools.
3. Constructivism. Although there are different meanings of the term, they all have a common standpoint according to which knowledge is created by learners who try to give a sense to their experiences (Ertmer and Newby, 2017).

The International Society for Technology in Education (ISTE) is an NGO and a global community of teachers and educators believing in the power of technology as a mean to transform education and the learning processes. It has developed a list of 29 standards stating what students, teachers and educators would be able to do thanks to technological improvements and rethinking education. Through the creation of new imaginative solutions to solve problems, students would be able to set a roadmap to transformative learning and the key standards to do so are: empowered learner, using technology to actively choose, achieve and demonstrate competency in the learning goals; digital citizen, being able to use technology in a legal, safe and ethical way; knowledge constructor, creating meaningful knowledge and learning experience; innovative designer, using tech to create innovative solutions; computational thinker, developing new strategies to solve problems; creative communicator, communicating

and expressing themselves in a clear and creative way; global collaborator, joining forces with other people and teams both locally and globally (ISTE, 2007).

The most specific and updated definition of EdTech was given by the Association for Educational Communications and Technology (AECT). It states that educational technology is the study and the ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources[16]. This means the use and the implementation of the tech world and tech processes in schools as a simplifying strategy for learning and as a mean for performance improvement. The consequence is that the definition basically includes an integration among a wide range of learning experiences integrating technology. Each word used for the definition has a precise meaning:

1. Study. It means the slavish and continuous research on the direction that the development of knowledge is taking. In modern times, the focus is placed on the assessment of how it is possible to reach an effective correlation between the technological sphere and the learning one. Studies over educational technology are made thanks to the work of researchers and experts who are making evaluations directly in the field through the analysis of actual and true situations happening in their environment. The biggest struggle experts are facing is related to the state of being able to understand and implement new technologies and technological processes to the learning and educational field. The main aim is to evaluate the learners' participation and – as a consequence – to create a customized learning path, keeping the eyes over the real needs of children and distancing from the previous methods based on pre-selected instructional routines.
2. Ethical practice. The adjective should not be treated as related to rightness and morality, but as an essential characteristic in order to achieve success: educators

[16] Definition and Terminology Committee of the Association for Educational Communications and Technology, The Definition of Educational Technology, June 1, 2004.

need to question their practices to understand if they are conducting a teaching process in an ethical way. Nowadays, ethical practices are based on the efficiency and the effectiveness that is used in order to make technology and education intersect.

3. Facilitating. It regards the cause-effect relationship between education and learning. from this, it follows that the aim of education technology is to support learning and not to monitor it, since technology should be seen as a way to explore the matters. It is made of the design of the environment, the organization of the resources and the preparation of the needed tools. This state of the things makes the coexistence of different settings possible – for example, face-to-face and distance learning.
4. Learning. It means to effectively understand and solve a problem, but it is made off many different possible approaches. This depends on the fact that it assumes an evolutionary perspective that follows the flow of the technological development: nowadays, for example, learning is meant in a more inclusive and immersive atmosphere than it was in the past and cognitive tools are considered as supports and guides for learners.
5. Improving. Here the focus is posed on the effectiveness of the implementation that directly involve efficiency too. If specifically related to EdTech, the term regards the real effects produced by technological tools, such as effective learning and changes in the learners' capabilities.
6. Performance. It means the ability of the learners to use in the correct way the new capabilities acquired. The features of creating, using and managing can be perceived either as separate entities or as a system according to which each phase goes along with a deep evaluation process.
7. Creating. It refers to every component needed for the constitution of the learning environment and to the variety of activities needed for the creation of the environment itself. The didactic process should be considered in its effectiveness and so the following actions should be taken on if they lead to improvements.

8. Using. This means creating linkages between people and newness in the learning landscape. Every novelty should be accurately selected in order to be implemented at best in the teaching-learning process of a precise society. At first, people should make evaluations over the existing materials to investigate whether they could be used for current problems and present audience or not. Then, new approaches are assessed as well. Only under condition of a positive test, the implementation would be spread on a large scale.
9. Managing. This is related to the organization of the work that should be done by practitioners: it requires processing information, planning people, programming evaluation, monitoring quality and results.
10. Appropriate. This reminds to the ease with which devices should be used and so the fact that the problem considered must be solved in the simplest and most linear way possible. Here, technology should be taken as a mean to simplify the process because it allows to connect people together, share problematics and find a joint and sustainable solution.
11. Technological. This is because the definition requires an innovative and scientific application modifying both the process and the resources used: the first is hit by the development of quantitative and qualitative researches, while the second is affected by the application of with software or hardware approach.
12. Process. This resembles all the activities needed to get to the desired result, from designing to producing new tools for learning. It should always keep the learner as the focal point and so to directly consider each one's experiences and struggles.
13. Resources. These are the equipment – from physical instruments to the knowledge – needed for the didactic process: obviously, the pool of resources increases its capacity together with the advancement of technology. Discovering new resources is a task of the teacher, while the learner can collect them and pick the right ones according to his needs.

It turns out to be clear that the EdTech is complex and a sector affecting different industries and so going beyond the mere education one. For example, entertainment is

one of the most important industries related to education technology since toys and gamification are two pillars of EdTech devices. The aim is to give kids an engaging tool that is able to make them learn something new, leveraging the impact of visual content and using games as a mean to deliver new knowledge and skills – quizzes, coding, language learning, mathematics. Manufacturing is also approaching the field of education technology to fill the gap between the skills workers already have and the ones needed to follow technological changes: tons of online course are provided inside organizations, for example to make people learn how to use new machines or new management platforms. EdTech is also approaching the creative industry, offering courses for photographers and graphic designers and developing apps facilitating the work of creative professionals, in partnership with well-known companies, and the customer service one too through the use of sales tutorial and online knowledge banks. In the end, another industry is the non-profit: there are platforms helping volunteers enriching their set of skills and gaining the required knowledge before charity missions, for example (Medium.com, 2017).

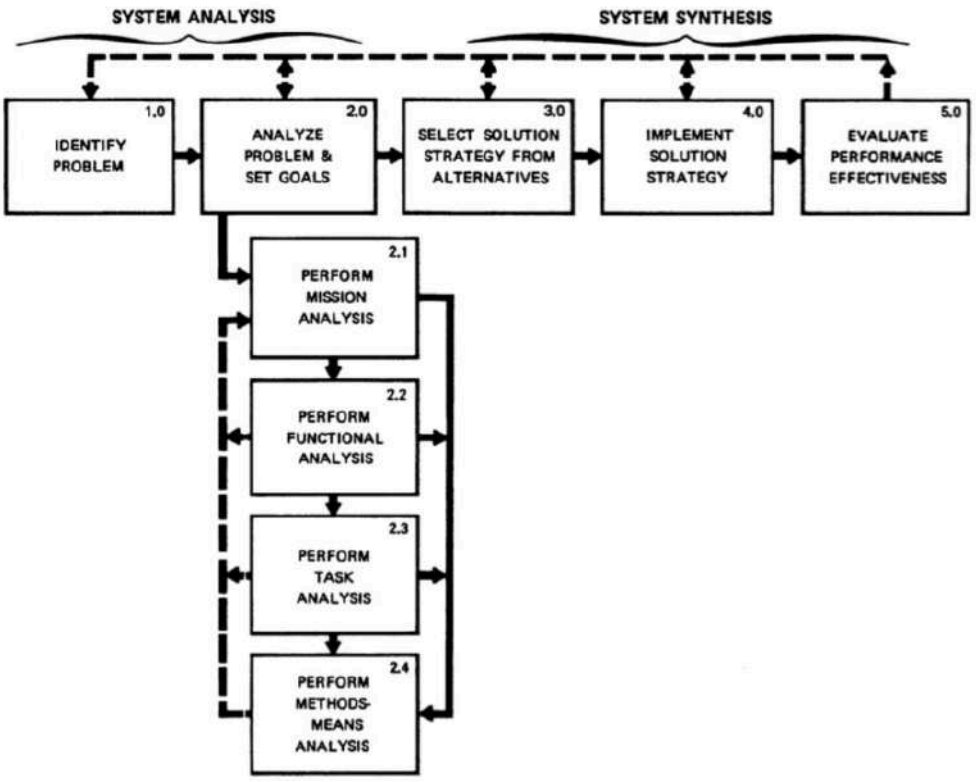
2.4. From software to hardware and to system approach

The software approach linked to the education technology field is based on the so-called behavioral science and it is made of principles coming from philosophy, psychology and sociology. Since there is a close connection to shaping the behaviors of people, the approach is characterized by the appropriate selection of both learning and teaching strategies, the clear identification of objectives and the attention to providing feedbacks and giving evaluations, aiming at increasing the efficiency of the exchange process between teaching and learning. One of the most important characteristics to be underlined is the fact that it is not possible to precisely separate software and hardware approaches because of their interconnection: the first helps the creation and the production of materials that are then used by hardware items (Maheshwari, 2016).

The implementation of a hardware approach lies in the application of engineering principles for instructional purposes that, in EdTech, would help both teachers and learners, making it easier to evaluate students, to control their progresses and to improve the experience provided. The approach typically leads to mass utilization and so to an implementation that is based on a large scale: these two features allow to reduce costs and to provide an educational benefit that it potentially usable by masses. Common hardware tools are for example radios, slides, videos and computers and, for a correct use of these gadgets, a deep software knowledge is required and fundamental (Parankimalil, 2015).

With system approach, we tend to identify solutions able to combine internal and external factors in order to solve problems and it is made of two categories: system analysis and system synthesis. The first category represents a system that is based on splitting a bigger problem into smaller parts or subproblems that will be analyzed using specific tools and strategies, keeping in mind the bigger mission or outcome. Here becomes fundamental to find out the needed skills for the considered task that is needed to be solved. On the other hand, the second category is about the analysis and the evaluation of the possible solutions to the problem (Kaufman, 1968).

Figure 19: How system analysis and system synthesis work together.



Source: Kaufman, 1968.

If specifically related to the EdTech industry, the system approach symbolizes the involvement, the interaction and the connection of all the components – teachers, students, content, lectures and evaluations – of the didactic process. According to Dey[17], the process works as a flow from inputs to outputs, throughout which feedbacks are given. The group of inputs is made of people – such as teachers, administrators and students – and instructional materials; these elements are then mixed together in the process that is basically a bundle of activities performed by the inputs, such as laboratory works, recreation, teaching-learning practices and co-curricular activities; in the end, the outputs are the result of the process that results in a deep focus over the achievements' of the students and over the performances reached in both scholastic

[17] Dey N., Introduction to Educational Technology, 2017.

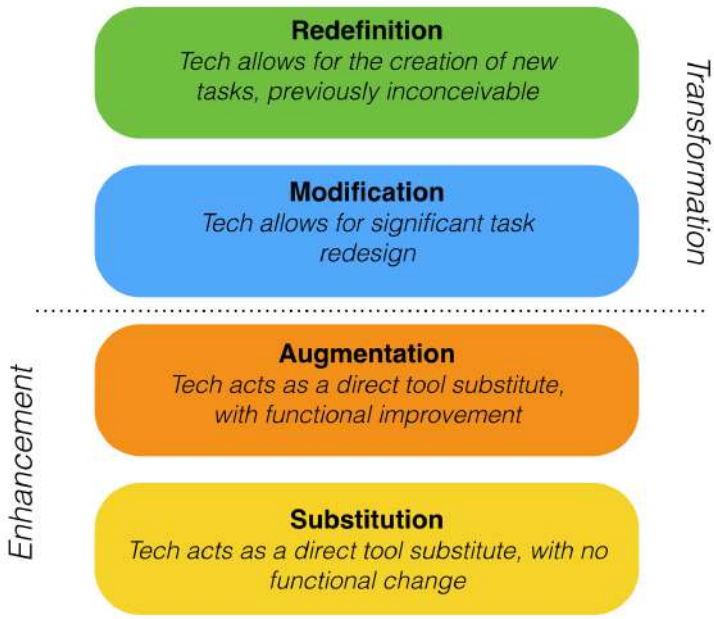
and non-scholastic fields. Before applying this particular approach to education, there is the need to specify some rules and to define some aspects. For example, there is the need to formulate the goals we want to achieve, to decide how to reach those goals, to select the methods and the appropriate learning experiences, to give precise roles to the parties involved in the process, to carry out an action plan and to detect and evaluate if the predefined objective are reached and eventually revise the system. The process works thanks to the coexistence and the collaboration between software and hardware approaches and it encloses the possibility to create customized platforms able to allow a constant improvement and self-correcting actions and founding a perfect environment to reach didactive aims through problem solving methods. The advantages coming from the implementation of such a system are multiple: making education interesting and productive thanks to the technology-based tools and devices that can be used, such as visual materials, that are created with a pedagogical aim; using multi-sensory methodologies coming from the combination of hardware and software that allow to involve all the senses in the learning process, since the focus is no longer over the ordinary in-class activities; increasing management's efficiency and effectiveness because education is made easier and organizing and controlling the didactic processes would require less effort; following the correct path for the desired outcome thanks to information technology; enabling distance learning because technology has the power to enlarge the number of people having access to education; personalizing the process of learning and creating customized paths made of planning lectures, providing online support, learning through multimedia content, supplying learners with tools based on each one's interests. Finally, there are also the major downsides to be considered that are basically cost and budget constraints, the resistance of the school system to the already set mentality and the generalized belief that the new technique would take a long time to make both teachers and learners achieve their goals (Dey, 2017).

2.5. SAMR model

The SAMR model – acronym for Substitution, Augmentation, Modification and Redefinition – was developed by Ruben Puentedura[18], a researcher who focused his studies over technology and its impact on education: he thinks that what makes the difference is how technology is used in education. According to his theories, people should not reason on a specific piece of software or hardware, but on how the teaching process changed in the era of technology improvement and development. The theoretical framework has the aim to facilitate the integration of new technologies in didactics in order to develop new learning environments, to manage tools and to build more effective paths for learners. Typically, having new technologies in the market means that there could be either the augmentation of the power of the existing tools and devices or new features. Puentedura concentrated his strengths on the situation in which novelties enter the teaching world changing the schemes, the environment and the procedures and so on how different uses of technology can have different impacts on the teaching-learning process: these different types of use are expressed by the SAMR model. The model has been constructed as a 4-level theory to follow every step of the development and application of a new technology and so to implement EdTech solutions starting with the introduction of the technology and its improvements, going on with a phase of transformation. At the end of the process, the result should display that the implementation of technology has enabled incredible experiences for students that were not possible with the older teaching methods.

[18] Puentedura R., The SAMR Model of Technology Integration, Hippasus.com, 2010.

Figure 20: Visual representation and brief explanation of the SAMR model.



Source: Showbie.com, 2014.

Substitution means that the new device simply works as a substitute of the existing situation: it represents the very first bid in introducing a novelty in a process that is already consolidated for some time, even if it is just about a mere replacement of analog tools with digital ones. This phase is typically characterized by uncertainty and several questions about the feasibility of the project and the actual gain that can be obtained. The subsequent stage is the augmentation in which technology acts as a direct substitute of the analogic device, gaining functional relevance. Here, everything that is related to the didactic process is enhanced by the tech sphere, allowing a deeper learning for the students and a reinforcement of the level of engagement in them, but this is also the phase during which educators must judge the effectiveness of the change. Then, it comes the modification stage, specifically dedicated to task redesign through technology, since this is the first part of the transformation phase, and here teachers have to detect if a change could improve the project's potentiality, keeping learning as the core point. There could be situations in which more than just one change is required. Finally, there is the redefinition stage that is about the creation of something new: the phase is characterized by the creativity of the learners and their push to give birth to

their own content through the use of the approved technology. The idea is usually supported by a collaborative process in which students work together with their classmates, are helped by educators and listen to the advices coming from mentors. Students change their status from passive learners to inventors and builders who actively shape their own learning path.

2.6. EdTech in numbers and Education 2030

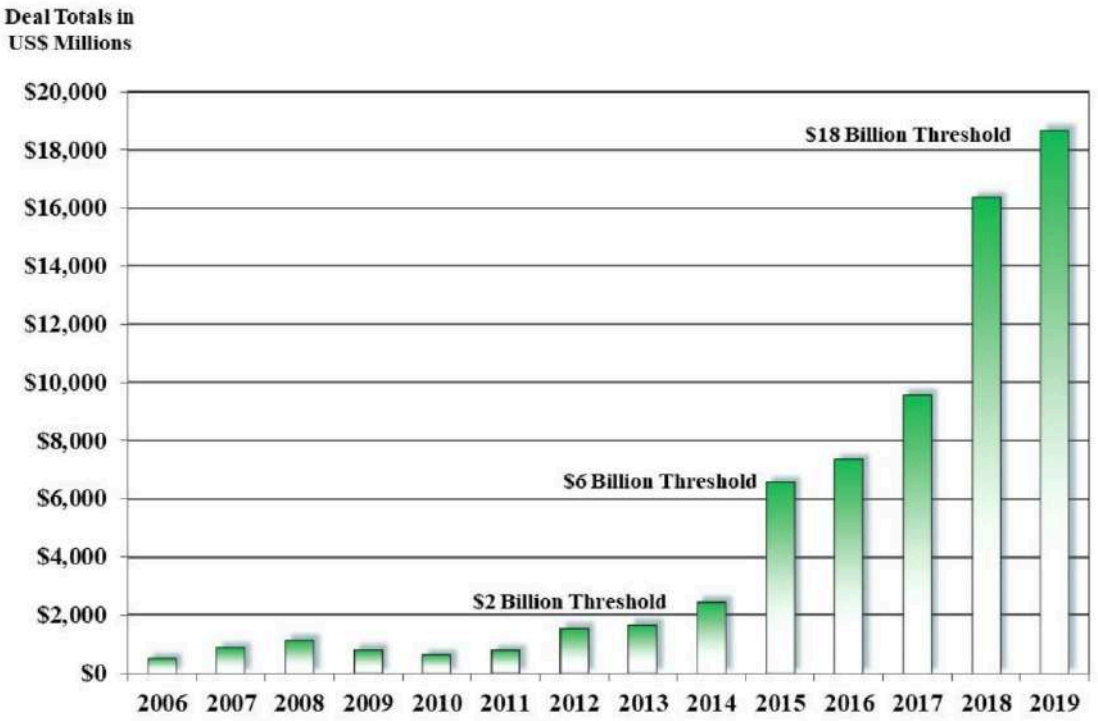
All over the world, there are more than 4 billion internet users[19]. Internet's exponential spread was able to reach even the most remote countries, allowing an unheard-of information flows that facilitated education access.

Nowadays, looking at the education industry in its entirety, it turns out to be visible the under-digitalization that characterizes it. Even if the global investments reached 6 trillion USD, even less than 3% were specifically dedicated to educational technology, resulting in a digital backwardness. Despite this situation, things are gradually changing and the investments in the sector are increasing: the global investments were worth 9.5 billion USD in 2017 and 16.34 billion USD in 2018 – the historic record – with almost 50% of them going to Chinese companies in the EdTech sector, till the 18.66 billion breathtaking total investment reached last year by education technology companies. Right after China, the other countries that obtained the largest investments' flows were the US, France, UK, Germany, Scandinavia, Israel, Australia and Canada. Last year was characterized by a shift in the previous years' tendency that viewed the Chinese EdTech market at core of the industry – a reduction from 7.22 billion USD to 3.9 billion USD – because of a number of different factors. The greatest inhibitors are the regulations imposed by the government, the severe norms and laws related to the internal

[19] Internetworldstat.com, 2019.

education system and the strict agreements foreign companies must sign before approaching the Chinese education market, but also the growing number of online education platforms and startups (Meetari, 2019).

Figure 21: Global private investments in learning technology from 2006 to 2019 and total investments in quarters from 2015 to 2019.

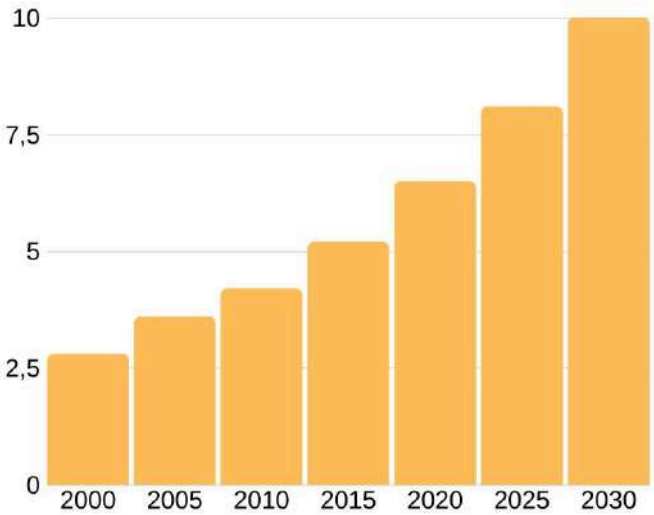


Quarter	2015 Investment Totals	2016 Investment Totals	2017 Investment Totals	2018 Investment Totals	2019 Investment Totals
First	$1,414,184,500	$1,647,774,500	$1,397,708,010	$2,991,208,477	$4,755,079,712
Second	$1,534,885,000	$1,549,500,615	$2,795,427,000	$4,937,951,417	$3,143,107,305
Third	$1,234,974,100	$2,201,935,897	$2,580,695,172	$3,193,822,884	$4,565,541,128
Fourth	$2,358,561,918	$1,940,404,408	$2,788,824,832	$4,866,659,050	$6,197,308,321
Total Annual Investment	***$6,542,605,518***	***$7,339,615,420***	***$9,562,655,014***	***$16,344,641,828***	***$18,661,036,466***

Source: Meetari.com, 2019.

From the analysis conducted till this point, it turns out to be fundamental to talk about the forecasts done over the EdTech industry for the next ten years. The most important research was conducted by Holon IQ, a platform completely dedicated to education whose main purpose is to connect together technology, entrepreneurship and skills to transform the education industry as a whole. According to the researches done by Holon's experts, even if the future is not always predictable, it is possible to detect some important signals that are likely to reshape the size and the structure of education. Researchers found out that the most important forces driving such a change will come from Asia and Africa. The next ten years will be characterized by additional 800 million K12 students and 350 million post-secondary graduates, along with the need of 1.5 million educators per year. This evolution is basically driven by both the population growth in developing countries and the reskilling and the upskilling processes in developed ones. Their most important prediction is based on the worth of the education economy by 2030: they forecasted that the whole education industry will be worth 10 trillion USD by 2030 and they outlined five different possible scenarios based on the implications that innovation could have over the future of learning (HolonIQ, 2019).

Figure 22: Growth of education worth from 2000 to 2030 in trillion of US dollars.



Source: Personal elaboration from Holoniq.com, 2019.

The five forecasted scenarios represent ideas of possible futures based on key aspects featuring the EdTech world and able to influence the future of learning:

1. Education as usual. In this situation, a strong power is given to the current approach to education and so to the traditional sources and institutions, with a perspective of consolidation of the higher education, the emergence of global platforms and the resistance of the government as the main source of funding. Governments are stuck in improving local and unique problems, looking just at their surrounding economic environment. In this scenario, if on one hand traditional learning structures stay the trusted ones, on the other hand there is also the need for demographic change with a fundamental re-skilling process, mainly towards automation. Nowadays, there are huge movements and flows of talented workers, competition inside the country's boundaries is increasing and new capabilities are required in both developed and developing economies. In this situation, governments maintain their status of funding leaders of the education system and do not transform conservatory regulations, inhibiting innovation.
2. Regional raising. The dominance is given to regional alliances thanks to the brace of both political and strategical cooperation. This, together with regional talent hubs, could fill the gap between demand and supply in the labor market and strengthen regions. The forecasted situation is based on collaboration among countries, signing multilateral agreements and fostering education through cooperation. For example, the growth of emerging countries in Africa, Asia and the Middle East is resulting in an increased mobility of talented people and in an overall improvement of the outcome of education: the result is not the run of students to the West World, but the enlargement of the local workforce and the attraction of foreign students. In this scenario, the face-to-face relationship in classrooms is enriched by technology, countries' specialization starts to grow and shortages are filled across regions.
3. Global giants. The level of freedom characterizing some markets and industries nowadays has encouraged the birth of big and complex organizations able to

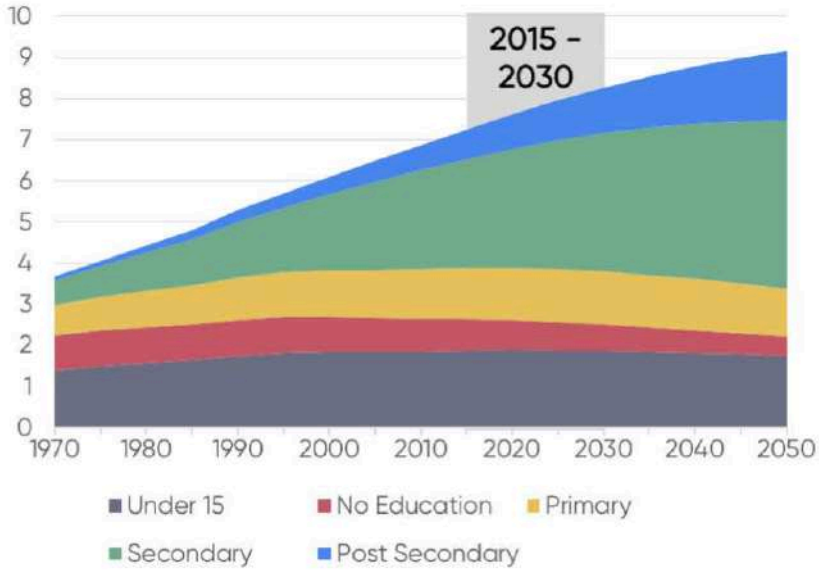
reach significant performances and power in the industry; and smaller companies are struggling to compete. Technology is allowing a unique level of interconnection and exchange in all the fields and, in education, the world is now characterized by the emergence of private and public powerful institutions. Including EdTech in such environment means that the two industries – the education one and the tech one – are progressively blurring their boundaries, innovative institutions are becoming affordable and inclusive for an increased part of the population and tech giants are providing huge benefits for learners and schools.

4. Peer-to-peer. The classical learning methods based on one-to-one communication and human-to-human customized experiences are gradually reconfigured by blockchain technology and technology is enabling citizens to shift their position form consumers to producers. It is estimated that by 2030 80% of the population will possess a smartphone and that global education will be based on online learning, mobile approaches and global platforms. The global demand will be able to reduce costs and investments in education will probably continue to go on as innovation will continuously produce not just educational but also financial outcomes.
5. Robo revolution. Artificial intelligence is the main driver of change and is now the main leader of learning, offering online and virtual mentors, teachers and tutors creating new learning paths, providing feedbacks and adjusting learning to the needs of the students. In this scenario, the information's world is extremely digitized and AI is now transforming every aspect of life. It is true that technology swept away a number of jobs but, on the other hand, it allowed the creation of new ones to manage and maintain these technologies and the ongoing rise of new skills made it fundamental to develop tech-focused training programs. Even if AI is increasingly pervasive, the value of skills cannot be replaced by machines.

Numbers suggest that emerging countries will be the driving force for global growth: developing economies are becoming more and more appealing outside their boundaries

and so able to attract foreign people and foreign investments because an ongoing process based on strengthening their macroeconomic situation. It is forecasted that the Emerging 7 (known as E7) economies – Brazil, China, India, Indonesia, Mexico, Russia, Turkey – will be able to increase their Gross Domestic Product until 50% by 2050 and that China will be the leading economy producing 20% of the world's GDP, followed by India, US and Indonesia. Specifically considering the education market, the US is maintaining its leading position, even if Asia is expected to drive the future growth of the market. Education market growth does not come without issues: for example, Holon estimates that the American market on its own is producing almost 1.5 trillion USD in student loan debt. Population growth will be one of the main drivers of pressure on education, adding 1 billion people by 2030 and so almost 800 million K12 graduates and 350 million post-secondary graduates. The main characters of this change will be Asia and Africa, with an average of more or less 60 million graduates every year.

Figure 23: Global population by education attainment from 1970 to 2050.



Source: Holoniq.com, 2019.

CHAPTER 3

THE RESEARCH

3.1. CET and MindCET[20]

The Center for Educational Technology (CET) is the most important non-governmental organization (NGO) in Israel, based in the northern part of Tel Aviv metropolitan area, nearby Tel Aviv University (TAU), specifically dedicated to the development of the educational system for every human being – Israeli kids, immigrant students, both metropolitan and peripherical communities, Hebrew and Arabic speakers and other minorities. The aim is to gradually build an advanced learning environment made up by the combination between technological platforms and devices and pedagogical content, from elementary school: the center seeks for the harmonization of these two elements to make the digital world serves teaching needs.

The organization founded an independent body called MindCET, an EdTech innovation center located in Yeruham, a small city located in the Negev desert that is developing and increasing its level of industrialization thanks to the CET itself – but there is also a subsidiary in Tel Aviv – whose aim is to bring together all the characters shaping the future of innovation in education, and so entrepreneurs, teachers and researchers in order to create a disruptive environment starting from Israel and then going further. It is basically a startup incubator and accelerator, focused on shrinking the gap between technology and pedagogy in order to significantly change the learning processes. Nowadays, only 50% of the enterprises under MindCET are based in Israel, while the

[20] All the information available in this paragraph come from the websites of CET and MindCET, from other online resources such as Start-Up Nation Central and EdSurge and from my direct experience on the field.

others are international: this situation reflects the willingness of the company to try to make the State's boundaries drop since Israel is a quite isolated country facing problematic situations with the surrounding areas.

MindCET has three major aims that it follows while running the activity: to seek for the creation of a new educational paradigm, to create strict connections between the educational area and the Israeli startups' and innovation's culture and to be a mean for the improvements in the learning processes in the name of the parent organization.

Figure 24: CET and MindCET logos.

Source: CET, 2019.

MindCET's revolutionary approach to the world of education is based on five pillars:

1. Entrepreneurship: the center supports the work of the independent entrepreneurs as the mean to create a broad range of new points of view and possible future developments;
2. Connection: since the center follows the Lean Startup methodology, it seeks for the creation of a strong network between companies, teachers and students from the very beginning of each activity;
3. Culture: the underlying cultural aspect is based on questioning the obvious and searching for innovative mental processes in order to find new alternatives related to the educational world;

4. Development: the center strongly believes in the constant relationship between innovative and realistic that needs to balance out;
5. Knowledge: the environment that is created is based on a continuum of sharing information, ideas and knowledge from entrepreneurs to educators and researchers and vice versa.

The center is primarily involved in three fields of actions distinguishable by the main character involved. Garage is the sector dedicated to startups and it is basically the accelerator program for new and innovative initiatives that aims to help newborn enterprises from the initial stages of their activity, to MVP, to raise capital, to penetrate the market and to eventually go beyond the boundaries of the country, but it works as a support for mature startups too. The weekly program proposed is made up by mentorship meetings, workshops, lectures, professional support and meetings with investors and potential users and lasts for five months. Overtime, MindCET developed other programs for startups that are rapidly spreading, such as the Global EdTech Startup Awards (GESA), an international competition that now has become the world's largest competition displaying EdTech startups all over the world, and the UK & Israel EdTech Taskforce, a joint venture for the growth of sustainable companies and an investment fund to create a bridge between the two countries. Laboratory is the area dedicated to teachers as change agents and as the leaders of innovation in the educational field: the MindCET Fellows program consists in making teachers entrepreneurs and so develop a prototype to try to solve pedagogical challenges and, since the trial has begun, teachers have been able to develop 40 educational tools that are now spread all over Israel; the TEAM project is mainly dedicated to testing and pivoting new technologies: here, educators try products and services before they were actually implemented inside schools. In the end, there is the Aquarium sector, specifically dedicated to research and development: it is focus over the exploration and experimentation of cutting-edge technologies for the new generations. Through a series of events, programs, meetings and workshops, MindCET has been able to build a strict network of important collaborations with foreign companies, other accelerators, publishers and tech giants. The result is that MindCET is increasingly becoming a

fundamental fixed point not just in the EdTech industry worldwide but as an innovation leader. As part of the R&D department, there are also the MindCETeX program, a program combining R&D and entrepreneurship for outstanding developers, the publications – a collection of papers and researches about the industry to be kept informed about the trends – and the vision groups, that are basically multidisciplinary think tanks.

Moreover, the organization leads the international EdTech summit called Shaping The Future and the EdTech Week and in the mid-2019 the it launched a new program called MindCET Go, a five-week international program for startups that already went through the early adoption phase and that are demonstrating growth, innovation and international exposure.

3.2. The methodology and the project

There are several ways of doing researches while considering the specific field of social science: each strategy – for example, analysis of archival information, the surveys and the experiments – has its typical advantages and disadvantages according to the research question, the level of control exerted by the investigator and the focus either on historical or on contemporary events. Usually people prefer the case study approach when the main questions to be investigated are why and how a recent phenomenon is happening. In a case study, the evidences may come from different sources, such as direct observation, interviews, recordings and archival documents, and they must be put together in order to compare different evidences of the same subject, to create a database aiming at data collection and to find a chain of proves supporting our main theory. All these precautions should be taken aiming at controlling and improving the quality of the research itself and at making the process explicit, so it would be conformed to the validity and reliability principles (Yin, 2002).

During my three-month stay in Tel Aviv, I have had the pleasure to work as business analyst directly with Gil Almog (Chief Product Officer and Head of MindCET Go), Cecilia Waismann (Vice President of Research and Development) and Paz Eliav (Head of Accelerator) to develop this new research over the EdTech world. They gave me the means to accurately go on with my project, starting from scratch, giving me advices and helping me open my eyes to see the bigger picture.

The aim of the research I was involved in is to understand which factors are affecting startups working in the EdTech industry and their probability of either success or failure. The focus was stressed over the Israeli market but considering companies involved in foreign markets – such as Europe, the US and Asia. I started the research by deepening the knowledge over this specific industry, in order to have a clearer picture of it, using documents, papers, videos and talking to the people inside MindCET. I went on searching for previous researches facing this topic, analyzing reports from big companies such as Nesta, Startup Genome and EdSurge, among others. This allowed me to build up my idea on how I would like to conduct the research and on what I would like to stress and underline. What I've found out is that many organizations already construct interesting questionnaires to investigate this topic and produce results over it. But the common trait of these outcomes is that the core point is usually the analysis of quantitative data, with a lower attention over the qualitative ones. So, I decided to dedicate my time in Tel Aviv over qualitative indicators.

I started by brainstorming all the indicators randomly coming up to my mind and then I grouped them in different categories. Since the information collected were numerous, I selected the most relevant ones looking at the aim of the research itself and created five different classes of indicators:

1. General information: all the personal data related to the founder, the co-founders and the other people of the team, such as the age, the educational level, their involvement in other businesses and their previous experiences;
2. Industry: data related to the experiences of the company itself in the very beginning of its business experience, about its connections to other firms – even abroad – and other industries, the feelings towards institutions and laws;

3. People: information on the team's cohesion, on the customers and users, on early adopter and potential users, on competitors and on social media management;
4. Market adoption: questions over the MVP and the prototype, the willingness to reach a global market, the affordability and understandability of the product or service;
5. Money and resources: information on the funding and investment side, one the level of revenues, on the business model and business plan and on personal perceptions about the research question.

Then, all these indicators were condensed together in order to create the questions done during the interviews. The aim was to make people free to express their considerations and thoughts about all the fields considered for the research, creating an informal atmosphere with the willingness to catch every moment of the dialogues[21]. Consequently, I set a range of possible answer to all the different questions in order to make it easier to collect them later. Everything was then condensed in an Excel file, separating each companies' answers from the ones of the other companies involved in the project. This was possible because all the scheduled interviews were recorded to make the conversation the most fluent and dynamic possible. Doing so, I had the possibility to listen to them again and again to catch the needed information – since the answers given were broad and discursive and I did not prepared questions assuming closed answers such as yes or no –, to write them down and to read them anytime. At the end of the transcription of each registration, I filled every Excel file up and this was

[21] Formerly, I also tried to follow another path by providing companies with a simple questionnaire to fill with basic information about the company and the team involved in it but, after a couple of tests, it turned out that the one-to-one interviews were the best strategy to follow, since the aim was to provide something new that people would be happy to be involved in and to get brand new information not yet discovered.

fundamental because I decided to focus on the aggregate result of the research, in order to try to find out common trends related to both a specific market and a precise geographical area: no personal theory and conclusion should be considered as specific for a singular startup, but the outcome should be taken as a generalized situation of the EdTech market in Israel.

List 5: Interviews' questions divided by macro-area of interest.

Category	Questions
General Information	What's the startup's main goal while running this business?
	Where do you see the business in five years?
Industry	Have you ever been in an incubator/accelerator?
	Have you ever had a mentor? What was his/her role?
	Is the startup connected to other industries besides the educational world? Which? How?
	Do you have connections with foreign startups? Where?
	Is the company part of any startup cluster of companies? Is the cluster affecting you somehow and vice versa do you think you are having an impact on the cluster?
	Which kind of impact do you think the company is producing over the society?
	What do you think about norms, regulations and legal challenges affecting your business? Are they blocking you somehow? Is there something you would change?
People	Do you think yours and your co-workers'gender, age and educational level are affecting somehow your business?

	How long have you been a team? Are you just co-workers or are you friends too?
	How do you usually manage conflicts? or how do you keep harmony among the team members?
	Did the company test the product with early adopters? How important is their opinion? Where they just in Israel or abroad too?
	What about the users and the customers? Which kind of relationship does the company have with them? Do you think users fully understand the potential of your product/service?
	Do you think the majority of the potential users know your business? Are they mainly located in Israel or abroad?
	What do you think about the use of social media? And about marketing in general?
Market Adoption	How long did it take you to come up with a solid idea/prototype/MVP? And then to create the product/service the company is currently selling?
	Is the company's aim to reach a local or global market? What are the steps you planned to reach a global market?
	What if the market would suddenly change its needs? Does the company have a plan B?
	Is the product/service affordable to the majority of the schools/classes/families/students?
	Are schools/people aligned with the level of technology and innovation the product requires?
	Are you focusing more on the technology and its improvements or on creating a new form of pedagogy?
Money and Resources	How long did it take to get the first funding? What was the source of the investment?

	What did you stress to convince the potential investors or how do you keep their level of interest over the company high?
	How long did it take to generate the first revenues? What's last year's level of revenues? What do you think would be needed inside the company to reach a great increase in the revenues or, for example, to double the revenues?
	Do you have a business model? And a business plan?
	Which do you think are the three main factors affecting the probability of failure inside your company?

Source: Personal elaboration.

Category	Indicator	Answer1	Answer2	Answer3	Answer4	Answer5	Answer6
General Information	Team's average age	≈ years					
	Team's average gender						
	Team's average level of education	≈					
	Running other businesses						
	Team's average years of expertise	≈ years					
	Average previous experiences in startup	≈					
	Average experience in EdTech	≈					
	Main goal running the business	money	social impact	worldwide expansion	disruption/change	pedagogy	
	Future perspective (5 years perspective)	expansion abroad	market leader	being acquired	new products/services	revenues/profits	
Industry	Incubated/Accelerated	yes	no				
	Mentorship	yes	no				
	Connection with other industries	yes	no				
	Which	hi-tech	engineering	gaming	psychology		
	Connection with foreign startups	yes	no				
	Where	Asia	Europe	North America	South America	Africa	Australia
	Part of a cluster	yes	no				
	Impact over society	yes	no				
	Blocking norms and regulations	yes	no				
People	Age, gender, experience affecting the business	yes	no				
	A team for how many years	≈					
	Kind of relationship	co-workers	friends				
	Problem resolution	talking	division of the roles				
	Testing with early adopters	yes	no				
	Where	Asia	Europe	North America	South America	Africa	Australia
	Users different from customers	yes	no				
	Understanding of the product's potential	yes	no				
	Potential user's location	Asia	Europe	North America	South America	Africa	Australia
	Social media implementation	yes	no				
	Which	Instagram	Youtube	Facebook	LinkedIn	Twitter	
	Competitors	yes	no				
	Point of difference from competitors	pedagogy	technology	customer relation	price		
Market Adoption	Time to protype/MVP	≈ months					
	Time to final product	≈ months					
	Target market	local	global				
	Plan B	yes	no				
	Affordability	yes	no				
	People's alignment with the technology	yes	no				
	Main focus	technology	pedagogy				
Money and Resources	First funding	≈					
	From who	angel	pre-seed	seed	family/friends	personal money	
	2018's revenues	≈					
	Business model	yes	no				
	Business plan	yes	no				

Some information – co-founders' age, level of expertise, number of people of the team, previous experiences and so on – were quite easily researchable on the website of the companies, on social media and on other specialized platforms, such as Crunchbase and Start-Up Nation Central; for the other information, I created different sets of questions and then scheduled interviews with the companies that have expressed their willingness to participate in the project.

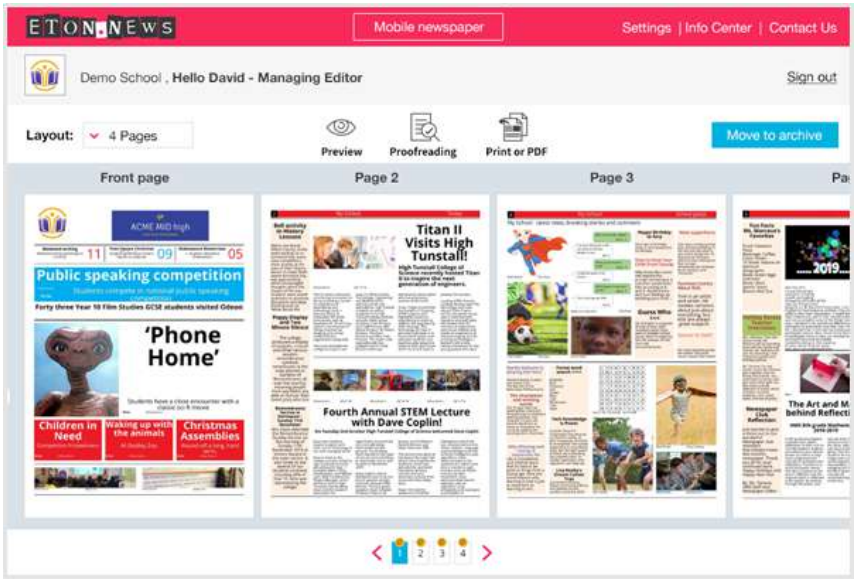
I interviewed seven companies producing and providing different products and services, involved in both B2B and B2C markets related to the EdTech sector – the former assumes a direct relation with schools, while the latter an immediate connection with educators, parents and kids. The first company I have interviewed was Storyball, an interactive game ball for kids from 4 to 10 years old that makes them engage with physical activity. The ball is screen-free but equipped with many sensors and a speaker, there are different characters kids can use, each of them related to specific personalities, missions and games. It is considered as a new way to play and a mixed reality experience. The idea was born for rehabilitation – people could squeeze the ball, throw it, use it for manipulation and so on – but then the company decided to gamify the device, making it an interactive and playful game. The game comes with an app for smartphone and tablet that allows parents to check and track the progresses in terms of movement, mental ability and enjoyment.

Figure 25: The product sold by Storyball and the so-called skins produced until now.

Source: Mysotriball.com, 2019.

The second company was Eton.News: this is a pedagogic platform for schools to make children engage with journalism, aiming at enhancing abilities such as teamworking, empathy, storytelling, curiosity, critical thinking, creative thinking and language skills, but at the same time it allows to develop media literacy and online skills. Kids can create their own newspaper that can be both digital and printed: the app allows to write and edit news, advices for trips, events and experiences, add photos and videos, choose the preferred template, define the magazine size and the visual structure. The platform is already used by more than 1,000 students in 30 schools.

Figure 26: Example of online newspaper by Eton.News.

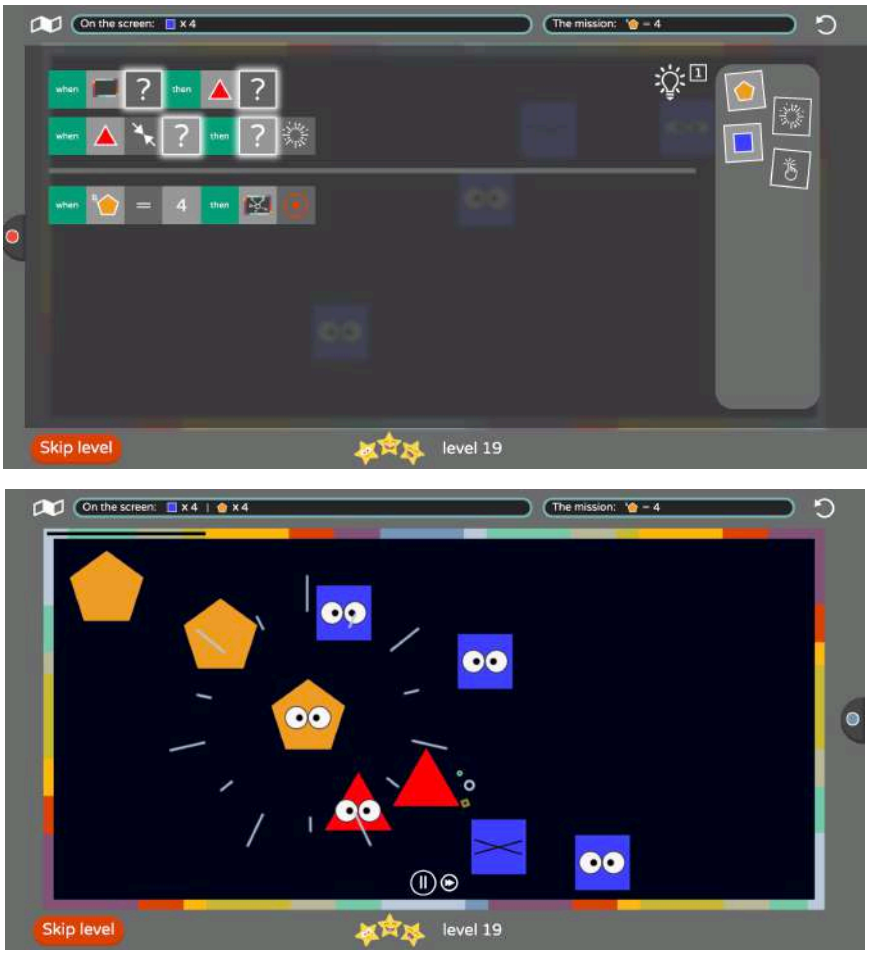


Source: Eton.news/en, 2019.

Then, Plethora is an outstanding platform for computational thinking skills and problem solving dedicated to children from age 8. The scenario is a game that comprehends intuitive principles and challenges to make kids improve specific syntax and programming language, without specifically focusing on it: in the form of a riddle game, it allows to develop inter disciplinary skills and it makes children look at the bigger picture and understand the algorithm needed to solve a specific issue. Since nowadays,

100,000 students have already practiced the game that was also chosen by the Israeli Ministry of Education to be played at the 2019 National Cyber Championship[22].

Figure 27: One of the levels of the game. The first picture represents the instructions the kid needs to give to the computer, while the second one shows the result.



Source: Iamplethora.com, 2019.

[22] The championship's aim is to look forward for an increasing adaptation of the education system to the trends of the 21st century and so to promote technological and pedagogical innovation in schools. The objectives of the project are to give every child equal opportunities, to realize their potential and to give them an opportunity for social mobility (Ministry of Education in Israel, 2018).

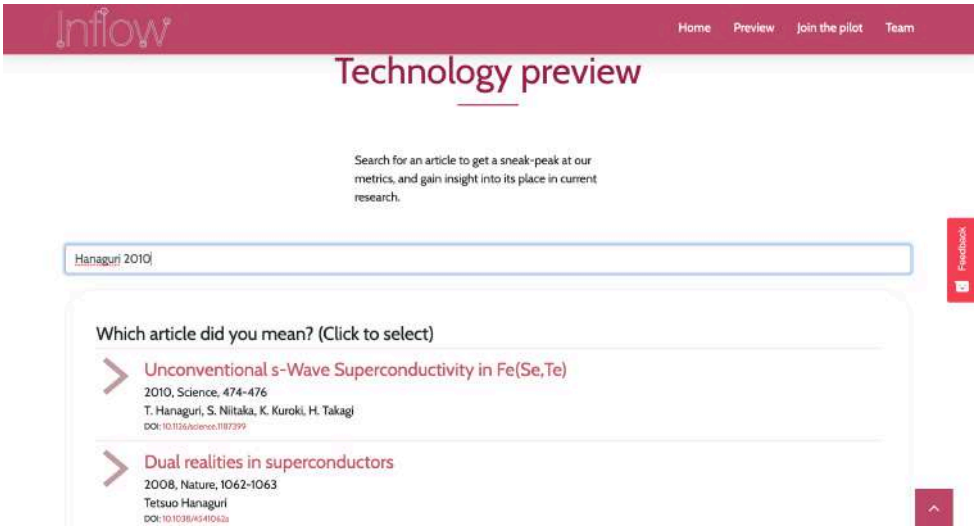
Looking at the content, there is a very similar startup to Plethora, called Kidistartup. This is a coding platform allowing children develop educational games for themselves and also in a collaborative way, aiming at making kids confident with the Artificial Intelligence world from the age of 7. As other companies in the market do, KidiStartup willingness is to make children deal with programming, coding and informatics syntax but through gamification: kids create their own game and levels from scratch, deciding the character attributes, the landscape aspect and the missions to be solved. Here, the peculiarity is that each kid is not working on his own, but everyone can contribute to the final result, so all the relational areas are stressed too.

Figure 28: The different possibilities for the visual representation of the game.

Source: Kidistartup.com, 2019.

Then, Inflow is a startup that provides an algorithm allowing to evaluate scientific researches and publications and then to rank them according to different parameters – such as the level of importance and quality in that specific field, credibility and reproducibility. It also uses a predictive analytic in order to estimate not just the current potential of a specific paper or research, but also the future one. For now, it is mainly involved in the bio-medical area and so for researchers and not for schools and kids.

Figure 29: How the Inflow platform works.



Source: Inflow.live, 2019.

The most important interview I have had the pleasure to schedule was the one with Code Monkey Studios. This is a famous game-based learning platform that teaches students from 8 years old coding and programming, based on problem solving: kids learn this specific language through a progression of challenges in which a monkey catches the bananas to complete many different levels, but they can also create their own levels and share their personal HTML language with other children. Students are not left alone because they are always supported by hints and personalized instructions, that consider kids' advances pace, to go on with the game. The startup obtained an undisclosed round of funding worth 200,000 dollars in 0214, then, in 2015, it received a grant from public institutions, again in 2017 it received a 1.5 million dollars seed investment and finally, at the end of 2018, the company was acquired by a Chinese group for 20 million dollars. The game is now used by more than 10 million children and more than 75 thousand teachers and educators. In 2019, the company was awarded as the Best Computational Thinking Solution by SIIA CODIE, the Best EdTech solution for K-12 by EdTechreview and the Best Educational Online Digital Program for Kids by Whatson4kids.

Figure 30: Example of the missions the kid should complete.

Source: Codemonkey.com, 2019.

Coqua.Labs was the last company that took part to the project and, unlike the other startup considered, is mainly focused on the higher education – massive open online courses, publishers and universities – so the platform has at its core the content of a written resource, and not the pedagogical sphere, and its aim is to provide an analysis of the individual content consumption in order to create a personalized learning profile. Each information that is extrapolated from the habits of the learner is then used to improve the quality of the content of the papers, researches and publications – in terms of grammar, syntax, visual disposition of the images, and so on – that will be used by future learners[23].

[23] There are no pictures available since the platform is under a restyling process and the developers do not want to share information about it until everything is ready.

Storyball

Plethora

coQua.labs

CONTENT EMPOWERED BY TECHNOLOGY

ETON NEWS

Inflow

Empower Research

kidi STARTUP

CODEMONKEY

3.3. The results in numbers and their explanation

The results of both the researches and the interviews have been put together in order to find out a value able to represent the actual situation of the sample companies considered. I want to emphasize the fact that every number is the outcome of an aggregate result made by the combination of each answer given by the companies; then, the aim is to go beyond the mere arithmetic averages and the percentages that I have found.

Right after the chart, I am going to explain my point of view over each of the five categories, trying to create a reasonable connection with the final purpose of this thesis and so to give an answer to the question.

List 6: Results of the research in numbers.

Category	Indicator	Answer	Value
General Information	Team's average age	μ years	≈ 36.6
	Gender	Male	88.89%
		Female	11.11%
	Level of education	Bachelor	77.78%
		Master's degree	22.22%
	Involvement in other businesses	Yes	38.88%
		No	61.12%
	Years of expertise	μ years	≈ 9.4
	Previous experience in startups	Yes	11.11%
		No	88.89%
		Yes	11.11%

	Previous experience in EdTech	No	88.89%
	Main goal	Social impact	14.29%
		Worldwide expansion	14.29%
		Bring a change (disruption)	28.57%
		Pedagogy	42.85%
	Future perspective	Expansion abroad	50%
		New product or service developed	10%
		Market leader	40%
Industry	Incubated or accelerated	Yes	100%
		No	0%
	Mentorship	Yes	14.28%
		No	85.72%
	Connection with other industries	Yes	85.72%
		No	14.28%
	Which ones?	Gaming	33.33%
		Hi-Tech	16.67%
		Research	33.33%
		Informatics	16.67%
	Connection with foreign startups	Yes	57.14%
		No	42.86%

	Where?	Asia	28.57%
		Europe	28.57%
		US	28.57%
		South America	14.29%
	Involvement in a cluster	Yes	71.43%
		No	28.57%
	Producing an impact over society	Yes	100%
		No	0%
	Existing blocking norms and regulations	Yes	14.28%
		No	85.72%
People	Age, gender, experience affecting the business	Yes	100%
		No	0%
	How long as a group?	2 years	28.57%
		4 years	14.28%
		More than 5 years	57.42%
	Kind of relationship	(just) co-workers	28.57%
		Friends (too)	71.43%
	Conflicts' resolution	Talking	42.86%
		Division of the roles	57.14%
	Testing with early adopters	Yes	100%
		No	0%
	Where?	Israel	66.67%

		Abroad	33.33%
	Users different from customers	Yes	77.78%
		No	22.22%
	Customers' understanding of the product's potential	Yes	42.85%
		No	57.15%
	Potential users' location	Israel	0%
		Abroad	100%
	Social media implementation	Yes	77.78%
		No	22.22%
	Which ones?	Instagram	20%
		Facebook	20%
		YouTube	13.33%
		LinkedIn	20%
		Twitter	26.67%
	Point of difference from competitors	Technology	33.33%
		Pedagogy	66.67%
Market Adoption	Time to MVP	μ years	≈ 0.9
	Time to current product or service	μ years	≈ 1.6
	Target market	Local	0%
		Global	100%
	Eventual plan B	Yes	28.57%
		No	71.43%

	Affordability	Yes	100%
		No	0%
	Schools and educators aligned with the new technologies and the needed skills	Yes	28.57
		No	71.43%
	Main focus	Technology	42.86%
		Pedagogy	57.14%
Money and resources	First funding round	US dollars	50,000 – 200,000[24]
	Source of funds	Personal	33.33%
		Family	25%
		Friends	16.66%
		Institutions	16.66%
		Angel	8.35%
	Business model	Yes	85.71%
		No	14.29%
	Business plan	Yes	85.71%
		No	14.29%

Source: Personal elaboration.

[24] Outstanding result reached by just one company at the very beginning of the life of the organization.

3.3.1 General Information

According to the general information, it emerges that it is not so common to meet startuppers in the EdTech field younger than 36 years old and this tendency goes hand in hand with the gender gap characterizing the industry in Israel, since the almost the whole group of the innovative entrepreneurs, founders and workers are male (≈ 89%). The late age resulting could be linked to the mandatory military service the whole population must go through: for the Israeli, these are the typical years – from 18 to 21 years old – in which ideas and innovative thoughts arise because of the particular way of living of that period, shaping their minds for the rest of their lives. On the other hand, it seems to be easier for men than women to build a project and to go on with it: both the institutions and the entrepreneurs themselves are starting campaigns to increase the involvement of women in every kind of business in Israel – as well as other minorities, such as Arabs and Orthodox – and the general environment is progressively opening to new companies and organizations run by women.

The level of education mainly stops at a bachelor's degree level, with a weak percentage of people with a master's degree and this can be related to the costs of both living in Israel and attending university courses. The average cost for renting one room in a shared apartment in the city center of Tel Aviv is slightly more than 3,700 ILS[25] per month, to which to add utilities for more or less 200 ILS[26] and monthly public transportation for 250 ILS[27]. Three of the eight universities of the State are listed in the top 200 QS ranking and this is reflected in the prices according to the OECD[28] vison: Israel is the eighth most expensive country in the world for higher education, with a university tuition going from 2,957 US dollars in public schools to 7,028 US dollars in private ones – but the cost may vary according to the department and usually the highest fees are paid for the scientific ones (Il Sole 24 Ore, 2015).

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[25] This amount corresponds to 970 euros and 1,068 US dollars (proxies 25th November 2019).

[26] That is 52 euros and 58 US dollars (proxies 25th November 2019).

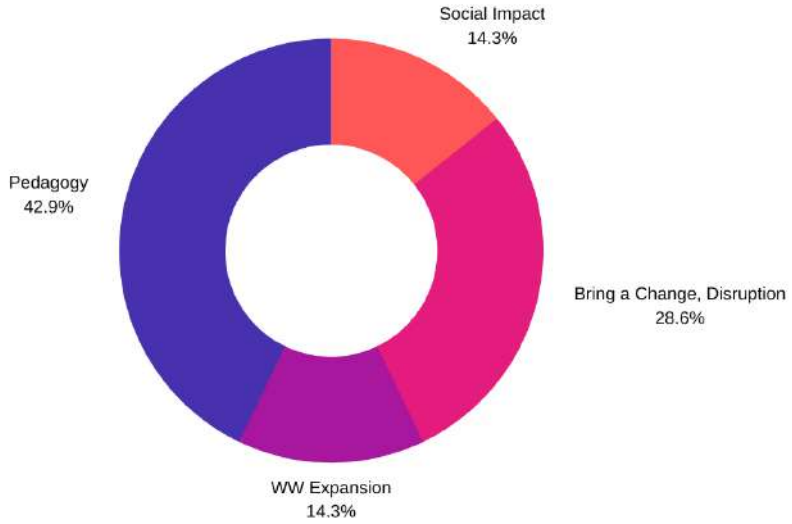
[27] That corresponds to 66 euros and 72 US dollars (proxies 25th November 2019).

[28] Acronym for Organization for Economic Co-operation and Development.

I considered a diversified pool of startups in order to be able to reason over different realities and the entrepreneurs interviewed gave me quite the same answers, when it came to talk about previous experiences in EdTech and not, but different talking about their involvement in other businesses or jobs. Keeping in mind the seven companies interviewed, it seems to be quite generalized that startups' founders usually have not less than 7 years of expertise in business in general – reaching an average of 9.4 years – considering the time people started their very first job after the graduation. It emerged that most of them have neither experience in startups (≈ 11%) nor specific experience in educational technology (≈ 11%) as a background, but they do have commonalities in previous experiences: most of them were employed in tasks related to computers, informatics and IT, and moreover they played a role of leadership inside the former company – for example, head of a department. Slightly more than the 61% of the people interviewed affirmed that they are not working in other realities, whatever they are, but the other part (≈ 39%) asserted that they are going on with other jobs and they are not totally involved in the EdTech field. This may be related to the fact that usually the first years of life of an organization are completely permeated by uncertainty and weakness and the startups could be eventually hit by everything, so the entrepreneurs interviewed generally already have families and children and they try to restrict the precariousness, but they also use the money collected to boost their new businesses.

When asked what the main purpose of their new firm was, entrepreneurs answered in a very diversified way. I had in mind six possible different answers touching various aspects: in an increasing order, I collected money (0%), social impact (≈ 14%), worldwide expansion (≈ 14%), bring a change/disruption (≈ 29%) and pedagogy (≈ 43%).

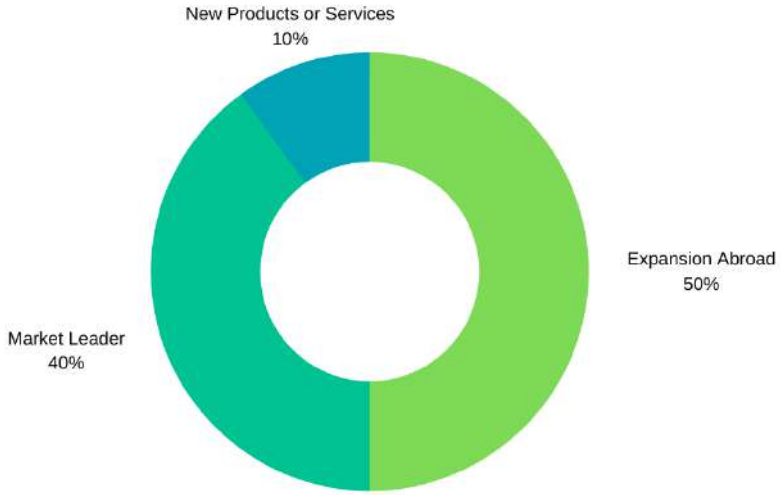
Figure 31: Graphic representation of the main goal of the interviewed startuppers.



Source: Personal elaboration.

I personally think the last two answers are the most interesting ones to be explained. They eventually work in tandem, so we could consider one as the consequence of the other: the desire is to create something brand new and able to change the way the pedagogical impact manifest during regular lessons in classrooms and at home too. They do not want to change the basic education pillars, but they are aiming at the integration of new subjects and way of teaching in order to enhance soft skills too – such as group working, empathy and collaboration. This ambitious purpose goes in tandem with the strong belief that in the mid-term – a five-year perspective – the startup would be able to go global and reach different countries worldwide: this seems to be one of the strongest pushes making startuppers go on with their project, together with the forecast of becoming a market leader in each specific EdTech's subsector.

Figure 32: Graphic representation of startuppers' future perspective (five-year forecast).



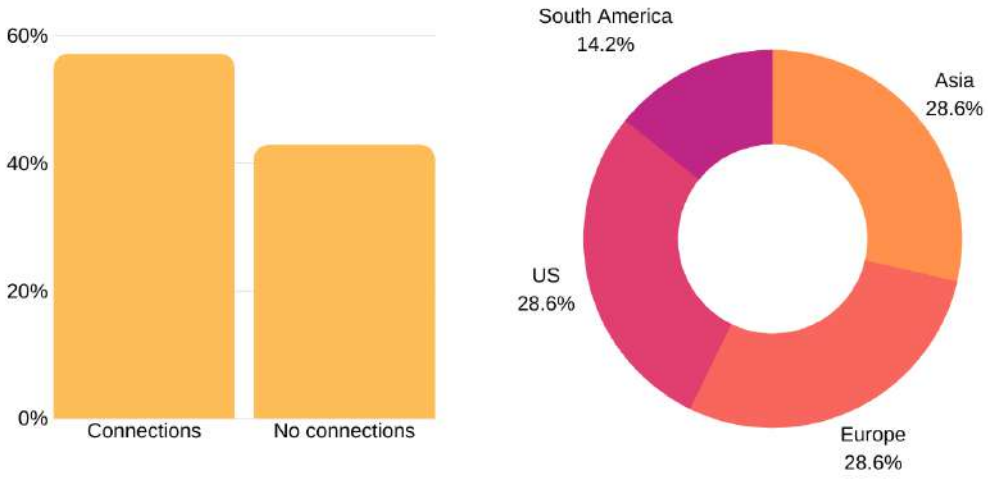
Source: Personal elaboration.

3.3.2 Industry

Going on with the part dedicated to the industry and the knowledge people have over it, other interesting results appeared. Although all the startups already went through either an incubating or an accelerating program, just a few of them (≈ 14%) have declared to have a mentor: the mentor is a physical person who operates as a guide, giving advices, making new-born entrepreneurs meet with each other and with investors and institutions in order to grow and to increase the possibility of success. The majority (≈ 86%) affirmed their reality goes beyond the boundaries of the educational sphere, touching other industries such as gaming (≈ 33%), research (≈ 33%), hi-tech (≈17%) and informatics (≈ 17%): this diversification clearly represents the inner characteristic of EdTech of being a melting pot, a multidisciplinary reality, a combination of diversified fields. Reflecting only over the startups interviewed, sometimes it seems to be difficult to discern between one subject and the other because education has been completely twisted by technology.

Another engaging point – related both to the latter situation described and to the 5-year forecast presented above – emerged from the answers given about the connection with foreign startups. I found a quite equal distribution between startups affirming the presence of connections with other and foreign startups and the ones that did not. This may be related to the early stage characterizing the nature of these young organizations: it takes time to build a network of connections and collaboration within the belonging State and this dramatically sharpen when considering other countries – even with adjoining ones; then, it is important to underline the fact that the industry is not so well developed as a worldwide reality.

Figure 33: Representation of the foreign connections of the sample startups.



Source: Personal elaboration.

Most of the connections already created mainly depends on the interest other countries and foreign institutions have over a precise product or service, but also on previous relationships. A great contribution is given by the strategic geographical position of Israel that, even if it has uncertain relations with nearby countries, on the other hand it has the privilege to be located in the middle between two continents – Asia and Europe. This position makes it a sort of bridge among deeply different worlds, people, cultures, economies and could allow Israeli startups to strike and potentially win over the others. This is also strictly connected and coherent with the long-term willingness of this pool

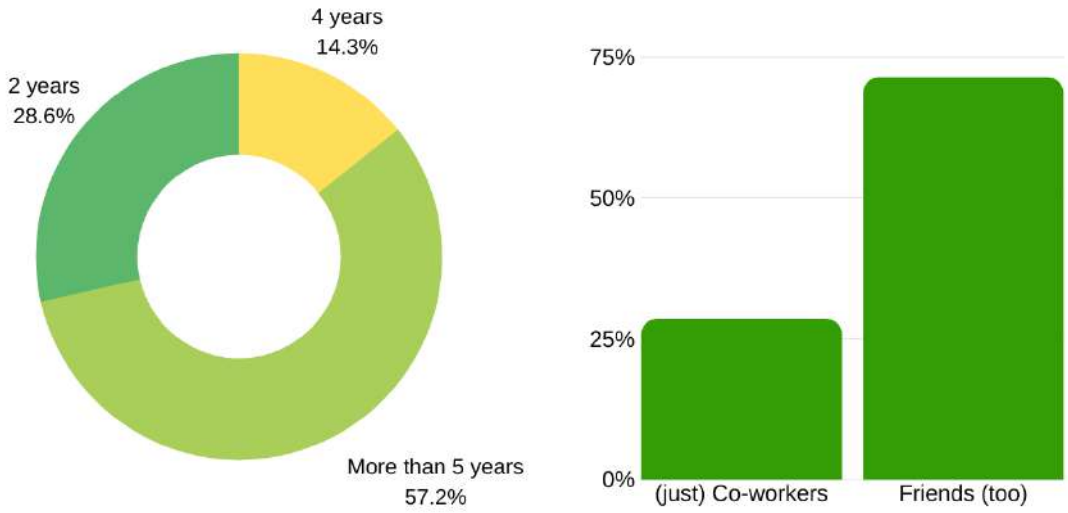
of organizations that are aiming at expanding worldwide. Moreover, it appears interesting the heed over Latin America: nowadays, in the area there are over 415 million people are connected to mobile network and in 2020 approximately 63% of the population will have access to the internet. This, together with a strong need of alphabetization, creates the perfect scenario for the development of EdTech possibilities: even if the online learning accessibility is developing, there is a huge education gap among children who do not receive high-quality education (Lustig, 2019).
At this time of the analysis, I personally found some common traits that made me think about a quite homogeneous group of startups but composed by organizations maintaining a strong personality and a clear identity. From the interviews emerged that almost the 29% of the startuppers do not feel they are part of an educational technology cluster in the Tel Aviv area, but that they are actually quite stand alone: even if the percentage is not very high, it made me question about the sense of belonging of people to their accelerator that should have the aim of creating relations and a familiar landscape. Despite this, all the entrepreneurs underlined their ambition to reach some kind of impact over society and to be game changers somehow: disruptiveness here is set as a mindset.
The last point of this section was dedicated to a reasoning over norms and regulations, since I wanted to discover if internal agents – such as the government and the state – could affect companies. The majority (≈ 86%) of the sample is favorable to the existing norms but this positive atmosphere mainly regards the sphere of kids' privacy and protection. The situation changed when considering the norms related to the international exposure of the companies: people have a generalized feeling of dissatisfaction because of the country situation of closure towards external agents and foreign countries that are fundamental for startups' goal. This can be related to both the conflicts still existing inside the country and the ones with the surrounding States.

3.3.3 People

Moving on to the people category, my will was to start with basic questions about differences of age, gender and previous university and work experiences of the team because I wanted to investigate if it is better a certain level of homogeneity among people or if co-workers and friends can find a simple way to deal with inhomogeneity. The whole sample of companies affirmed that the different specificities of the team members positively affect the business and the way the business is conducted. Despite the entrepreneurs' perception, the research shows that people tend to form groups with people similar to them, considering the age and the past experiences – for example, it has been uncommon to interview stratuppers with profoundly different curricula. In fact, researchers have found that homogeneous groups usually perform better at the beginning of a new project – this is the case of startups – and their creativity is boosted if properly incentivized; they tend to experience more positive experiences on average and, as a consequence, to be more satisfied. Moreover, similarities in race, age and gender allow to create a less unfriendly and hostile working atmosphere and mood among people (Academy of Management Journal, pp. 590-602, 1993).

Homogeneity is also the key to understand why almost the 57% of the interviewed people affirmed the team was born more than five years before, mainly for two reasons: people working on this specific kind of startups usually have met either at the university or during the previous working experience – same company, division or office. This situation clearly explain the next indicator because this is directly linked to the relationship and the level of involvement of people within the same group: the majority (≈ 71%) said there is a friendship relation at the base of the enterprise, while only the 29% affirmed the existence of a simple working relation.

Figure 34: Representation of the relationship between team members.



Source: Personal elaboration.

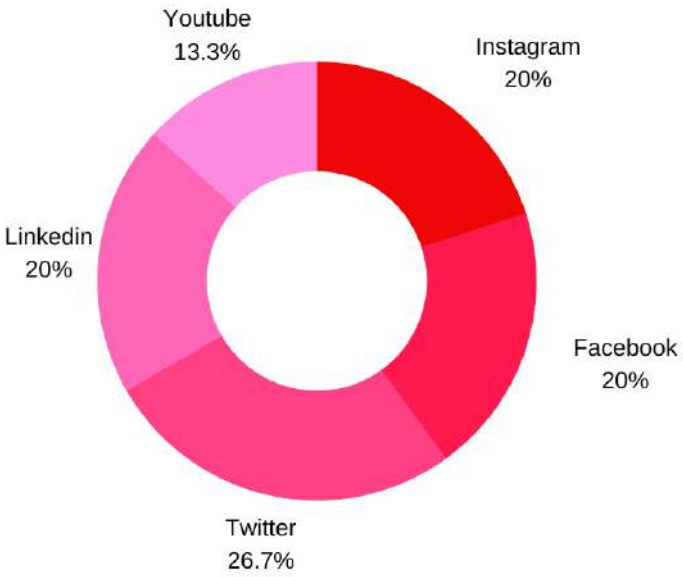
Homogeneity is also linked to the ease with which people affirmed they usually solve problems and conflicts inside the team: when a group is composed by individuals sharing mindsets, ideas, interests and goals, it becomes easier to avoid disagreements and interpersonal incompatibilities. People stressed that a clear division of the roles and creating an open environment in which people could feel free to talk are the key aspects in order not just to solve problems but to actually prevent them.

Then, I moved on with questions related to external stakeholders, such as, early adopters, customers and users. All the entrepreneurs asserted they have conducted tests with early adopters aiming at pivoting the product or the service, in order to launch the one that could best fit the market needs, and underlined the importance of doing this; but the data collected show that approximately 67% are located in Israel and only 33% are set abroad. This result seems to be in contradiction with the companies' will and goal: going global. On the other hand, we should consider the bundle of norms and regulations protecting but at the same time inhibiting the country and its actors of innovation.

As I expected, about 78% of the respondent stated that users are different from customers and this can be easily understood because the core business of the companies involved in the research is mainly dedicated to K-12. Usually parents and

schools actually buy the products and the services or institutions start programs involving schools and providing them a specific tool. I think this difference has a reflection in the statements of some entrepreneurs who are convinced that there is no full understanding of the potential of the products and services considered because of a fundamental discrepancy in digital literacy between parents and their kids. The generation gap is a reality startuppers have to face and try to solve in order to improve the use of all kind of EdTech tools both in schools and at home, to make them a normal way of teaching: there is the need to work on adults, trying to make them confident with technology and the simple skills needed to deal with educational technology services and products. The barriers increase and this aim becomes increasingly difficult if we consider the fact that all the potential users are located outside the Israeli boundaries, in profoundly different areas thinking about the school programs, the average digital literacy of both the older and the younger population, the average educational expenses per family, the governmental funds dedicated to the improvements of the education system and so on. A possible way to start to spread the knowledge of this field of tools, the associated technology and the pedagogical aim underneath them, could lay in the implementation of social media.

Figure 35: Social media use according to the entrepreneurs' statements.

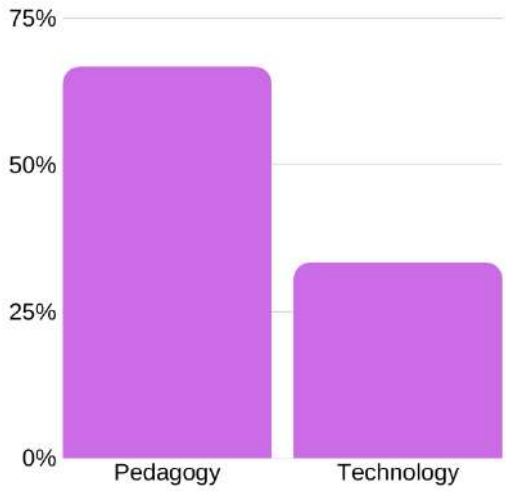


Source: Personal elaboration.

Even if startuppers asserted that 78% of them is involved in social media management and even if it could seem from the chart that the new-born companies are using a wide variety of social networks for different purposes depending on the one we focus on, the reality shows that there is not an actual implementation of them and that the published content is sometimes fleshless and poor. During the interviews, it has never emerged the need to have a qualified person for social media management inside the companies but, examining each situation, we can have a proof that something needs to change in this sphere. The main reason I want to underlie is that enterprises need to talk the same language of young people and, at the same time, make it easy for adults to find out the information needed: these platforms are one of the best ways every person and companies can use in order to increase the level of knowledge and the worldwide expansion.

In the end, the last question of this category was dedicated to a matter that emerged as fundamental over time: the point of difference from competitors. I did not want to focus on ordinary answers – such as, for example, price or communication program – but my aim was to understand what entrepreneurs leverage more between the technological sphere and the pedagogical one: I let them talk and then I linked the long answers they gave me to this two groups. The same question was then posed – in a direct way – also during the market adoption part of questions in order to collect eventual variances in the answers and thoughts of entrepreneurs. Even if one company admitted it has no competitors on the field right now, we can see a quite sizable discrepancy among the answers collected: almost 67% of the respondents said they leverage pedagogy, while the other part (≈ 33%) is focused over technology.

Figure 36: Representation of the dichotomy between technology and pedagogy.



Source: Personal elaboration.

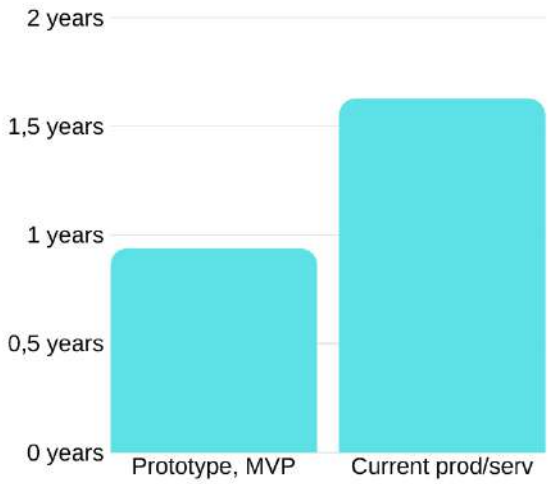
Even if the two aspects are bright different, it was not easy to discern among them because of the mutual commingling that emerged as a basilar component of startups in the EdTech field and this also raised some debates about which aspect is best to give importance to. The differences in the pool of answers are substantial and there is not a unique line of thoughts.

3.3.4 Market Adoption

I dedicated the fourth category to the market adoption, focusing my attention over timing and some products' general characteristics. From the analysis, it emerged that the average time to get a prototype and an MVP is slightly less than one year (0.937 years), but this is the result of strongly different data collected: for example, one entrepreneur said that the time needed was 3 months, while another one said 2 years. This brings me to say that for this particular aspect is hard to find a general trend, also because it depends on the numbers of pivots done during the period considered.

The situation was different for the investigation of the timing to the current product or service. All the startuppers underlined the fact that actually there is no final product because they are in a continuous flow of pivoting and product modification but, considering the product's aspect and features at the time of the interviews, it emerged an arithmetic average of 1.625 years, with 1 year as the lowest end and 2 years as the highest one.

Figure 37: Comparison between the time to prototype or MVP and the one to current product or service sold.



Source: Personal elaboration.

Then, entrepreneurs underlined again in a univocal way the willingness to expand their business worldwide because of the existing opportunities out of the Israeli borders and also because of the target market that is global for all the companies.

The same percentages were reached by the answers over the affordability of the products and the services delivered to the customers, considering both the one provided to the schools and the one purchased by parents. Analyzing the range of prices given to me, they appeared consistent with the answers given, mainly because the majority of the companies are able to reach the schools and other educational organizations thanks to special programs organized by the government and the institutions. Pricing is one of the major challenges for companies, mainly during the initial stages of their activity. First of all, the right price depends on the business model

previously developed and approved, since the goal of the company is to make profit and not to generate revenues. Second of all, even though a new-born company falls into an already existing market category, every new-born entrepreneur should consider the customers' price expectations over the service or the product sold. Lastly, startuppers must be able to communicate the value of their outcome and so to justify the price they associate to it. So, it becomes fundamental to construct a pricing strategy keeping in mind the particular strengths of the company and eventual gaps in the market (Medium.com, 2019). EdTech companies usually offer a trial period to teachers in order to check if the product can be compliant to the needs of the classroom or the school and so to demonstrate its usefulness: if the product were purchased, the price should be less than 5,000 US dollars per year. Differently, when directly dealing with parents and kids, the best formula is concentrating on high volumes of sales and low prices, keeping the price under 100 US dollars per year (Thetechadvocate.org, 2019)

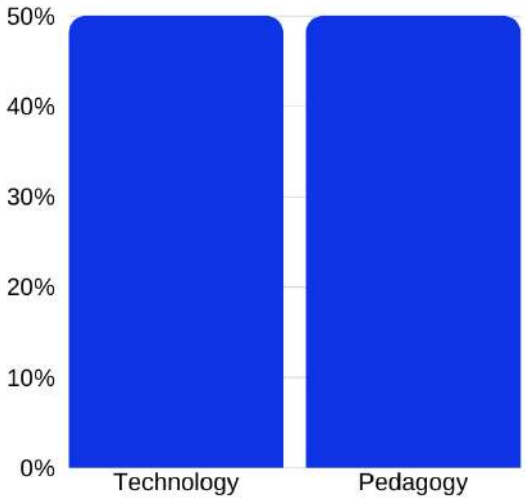
Again, the same percentages were the result of the question dedicated to the alignment of the people involved in the learning process: this statement is totally connected to the results obtained in the previous part dedicated to people and their level of understanding of the products potential. Even if the entrepreneurs are not evenly convinced about the people's understanding of what these new services and products for education could potentially bring into the society, they think all the stakeholders involved in this mechanism have the basilar skills and the minimum knowledge required in order to be conformed to what is provided and to be able to use these new tools for learning. Despite this, we need to keep in mind that the generation gap is still a problem that entrepreneurs need to overcome in order to satisfy the maximum potentialities of their companies: their aim is to bring disruptiveness in education looking at the children sphere, but what about teachers, parents and educators?

During the interviews, I asked something that may seamed controversial to startuppers, but my aim was to understand how broad their view of the whole situation is. I asked them if they had any kind of plan B to put in place, if a variety of problems should arise in their current businesses: one startup said it is already in the plan B, only a small part (≈ 29%) declared to be ready to change the business or part of it and the majority (≈

71%) admitted the only eventual solution would be to shut down the company. I personally think that firms such as the ones that are part of this research should be able to reinvent themselves according to the different situations because they are young, the people involved are usually skilled in particular subjects and they go on with their businesses knowing that – for now – EdTech is not a stable industry and as a consequence it presents some traits of instability and volatility.

The last point of this category was dedicated to the coexistence of pedagogy and technology, the main features of EdTech tools. During this part of the interview, I directly asked what was the main focus of the startup, if it was either the technological or the pedagogical one and the result I got was a perfect balance between the two possibilities: I obtained this perfect percentages because some entrepreneurs were not able to precisely answer the question and so to state that one attribute is more important than the other for them.

Figure 38: Second representation of the dichotomy between technology and pedagogy[29].



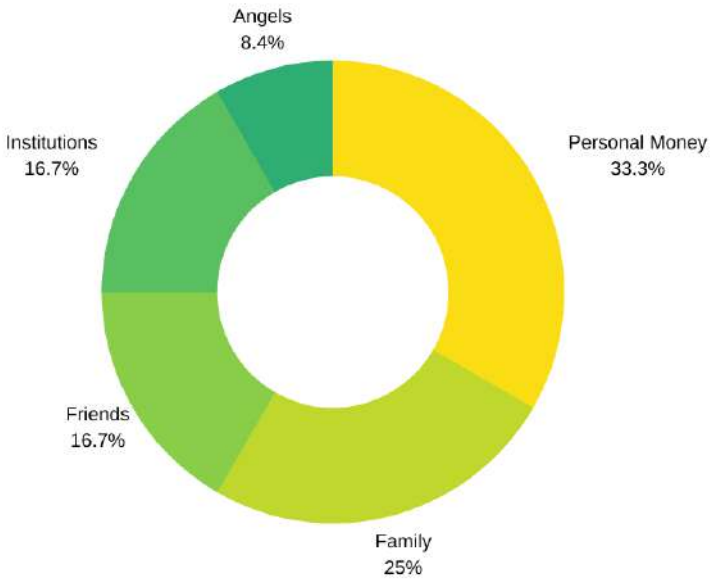
Source: Personal elaboration.

[29] This chart must be compared to chart 6 representing the same dualism but with a different final result.

3.3.5 Money and Resources

The final section of the interviews was dedicated to a delicate subject that is money and monetary resources in general. I was not able to collect all the information I planned to because of privacy and non-disclosure matters. According to funds and investments, my experience at MindCET helped me to better understand how this branch actually works for startups. Related to the very first stages of a startup's life, when the companies usually do not have a specific product or service to be sold in the market but just ideas and basic prototypes, there could be several different funding situations: pre-seed investments, a restrained money supply characterized by a very high level of risk; seed investments, usually coming from an incubator; the so-called Family Offices, investing in startups following the logic of diversifying their portfolio; business angel, a specific individual with experience in management or entrepreneurship who invests part of his assets and time over a specific project or a specific innovative startup; the club deals, business angels' having a limited financial envelop who form groups aiming at allowing higher investments and diversifying and diluting the risks connected to them (Assolombarda.it, 2019). Directly looking at my sample, what I discovered was that there are outstanding companies able to obtain remarkable first funding rounds: in this specific research, one company raised 2.2 million US dollars considering together pre-seed, seed and an angel investor with interests in foreign countries – such as Japan, China and India – who followed the startup from the first steps. This is an unusual and special situation because, from the other data collected, it seems that personal and family money are the primary sources of funds – 33.3% and 25% respectively.

Figure 39: Sources of monetary funds for startups at the beginning of their activity.



Source: Personal elaboration.

The last point was dedicated to both business model and business plan because I wanted to investigate if my thoughts about this aspect were well-founded or not. I expected to receive 100% of positive answers about the existence of these documents, but I discovered that this is not an actual reality. The percentage of negative answers is slightly more than 14%: this is not a high percentage and the main explanation is related to the fact that the companies are very young and in a sort of definition phase, so many aspects could change significantly overtime.

4.4. A black box reasoning

The term *black box* refers to the device used inside planes and ships that registers the conversations among the pilots and the technical data – such as temperature, speed and turbulence. It is constructed using materials that are resistant to any kind of accidents: this allows to investigate any possibility of failure in real time but also in the aftermath.

This turned out to be my research question: which are the aspects that could potentially hit startups in the EdTech field in Israel?

I started to investigate my research question reading an article from CB Insights[30] that is the analysis of the situation of 101 innovative startups that have shut down their business after failure. I wanted to have a general knowledge about the startup's world in order to create the basis for an effective reasoning over the data I have collected and explained before, to give the best hints specifically related to the Israeli educational technology field. In all the different industries and sub-divisions of them, usually there is not just one reason leading to failure because there are many aspects to be considered and every specificity leads to particular problematics that together could lead to deeply critical situations. Every point is not stand alone and there are quite a lot of connections between one another; although, it is possible to find a main reason of defeat:

1. No market need (42%). The most frequent reason of failure was investigated to be the inability to provide a solution to a specific market need. This happens because startups may be too involved in providing something interesting to know and to solve instead of thinking about actual problems. Having a great technology, expertise and wise advisors is not enough: there should be a business model focused over a real problem resolution in a scalable way.
2. Ran out of cash (29%). Every startup should find the right way to allocate monetary resources in the wisest way possible. This reason of failure was usually cited together with other problems such as failed pivots and failed market allocation. This is also connected to the possible difficulties in finding investors and financing the business.

[30] A global network composed by executives and startups aiming at empowering people through the discussion of specific aspects related to growth, competition and innovation. The article I am considering in the following explanation is called "The Top 20 Reasons Startups Fail", published November 6, 2019. The percentages provided by the website exceed 100%, since the startups interviewed have given and explained more than one answer.

3. Not the right team (23%). Being too different and having diverse skills and sets of knowledge inside the team was settled as a potential source of problems for companies; also, not having the right managers – such as the CTO or the CFO – or open-minded founders could lead to failure. Periodic checks are needed in order to investigate eventual discrepancies and problematics.
4. Get outcompeted (19%). Startups usually born because of outstanding and new ideas coming up to the mind but, when a specific idea becomes increasingly widely accepted, competition grows as a consequence and the number of new entrants in the market arises: ignoring their presence could lead to failure.
5. Pricing and cost issues (18%). Usually there are difficulties in setting the right price level for a product or a service, since it should be high enough to cover all the costs and, at the same time, low enough in order to bring in people. As a consequence, this reflects into possible discrepancy between the costs or running a business and the revenue streams obtained.
6. User unfriendly product (17%). The needs and the wants of future and potential customers should be the center of the reasoning for startups in order to develop the best product possible. Entrepreneurs should understand if their mindset, will and believes are actually the best solution for people or not.
7. No business model (17%). Creating a scalable business model is fundamental in order to attract investors, to have a precise direction to follow ordinarily and to adequately monetize it. Every business should find a way to turn the data collected into actions and actionable insights.
8. Poor marketing (14%). One of the most important skills to reach success is knowing the target market, the ways it uses to communicate and the way to get its attention. It happens that the team is mainly focused over the product and its features and not on how to market and promote it.
9. Ignore customers (14%). It is widely proven that ignoring customers and users can be fatal. Feedbacks and hints are fundamental in order to create a product or a service that fits at best the needs and the expectations of the market and going on pivoting: sometimes the team perspective is not the best one.

10. Product mistimed (13%). It is fundamental to calculate the best moment to release a new product or service to the market and planning can be faced – for example – through forecast and through the use of early adopters and sample users: too early could mean that the product is not understood by users, while too late could mean that competitors already saturated the market.
11. Lose focus (13%). There could be distracting sub-projects, personal problematics and a general loss meaning that people are no longer able to concentrate over the main aim of the startup. This usually negatively reflects over customers, retailers, investors and the team itself.
12. Disharmony (13%). Acrimony can show in many ways and with different stakeholders and it is not something related just to the founding team: for example, when the company is not able to create long-life connections with the investors or when a part of the team exercises an absolute control over the others, disharmony is created.
13. Pivot gone bad (10%). The process of pivoting can either improve the features of a product or a service, making it more appealing to the market, or bring the company on the wrong direction. Every time the team decides to pivot, there should be a reason and a calculated process.
14. Lack of passion (9%). If the team is involved in something that does not really interest them, the probability of failure increases. It could happen that, starting from a precise interest, the business then slowly moves into other related branches which, however, are not the main goal of the startup and this increases the chances either to shut down or to move on to something else.
15. Failed geographical expansion (9%). There should always be a reasoned choice in choosing a location for a specific business and so a connection between the company and the area of development, even if the team is working remotely. Being strong in a city does not mean the company is sorting the same effect in a different city nearby.
16. No financing or investors' interest (8%). This is a problem that could affect startups in every stage of their expansion, from the pre-seed to the following

rounds. If investors do not believe in the project and do not see future developments of it, they will not be willing to take risks over it investing their money and time. It also depends on the presence of competitors in the field.

17. Legal challenges (8%). It could happen that an outstanding idea had to face a number of legal complexities – related for example either to the supply chain or to the inputs or to the sustainability and so on – potentially leading to failure. Depending on the business and the industry considered, being compliant to norms and regulations is not always easy and inexpensive.
18. Did not use network (8%). Involving investors and other external stakeholders in the startup's life is a way to improve the efficiency and the effectiveness of the business. When starting a new business, there are tons of novelties that startuppers could be unable to see and forecast and creating a network of connections could help to overcome problematics.
19. Burn out (8%). It is important to be able to redirect the efforts put in a project if there is not an actual bright future for it; at the same time, the diversification of the team could help in doing so, as well as the classification of the responsibilities inside it. Founding a balance between work and personal life is not easy and usually overrated by new-born entrepreneurs.
20. Failure to pivot (7%). Being stuck in a specific vision or mindset could gradually weaken and destroy all the effort and resources put in a project but also harm the positivity of the employees towards the progresses of the product or the service. However, pivoting is not always the best solution because sometimes it is better to let a bad idea fail, if the startuppers have lost interest in it or if it is more suitable to create a new startup.

At the end of each interview, I had the pleasure to confidentially talk with startuppers who also felt free to ask me some questions about the research and my point of view about the research question, according to the information collected until that moment. I tried to ask them their fears about the future and what they think are the main problems that could specifically affect their company. Even if one entrepreneur told me they could be potentially hit by anything – since they are a new-born reality and they

are small for now – I decided to catalogue the information collected using the list above in order to find correspondences; what I got is a list of 10 potential problems and fears related to the sample considered[31]:

1. Get outcompeted;
2. Being unable to meet the market needs;
3. Develop a poor marketing program;
4. Not being able to meet the investors' interests;
5. Not being understood by the audience;
6. Disharmony inside the team;
7. Mistiming of the product;
8. Do not use the network properly;
9. Running out of cash;
10. Pricing and cost issues.

If, on one hand, these elements were a good starting point and allowed me to have a more precise focus, on the other hand they turned out to be too general for the EdTech industry. The reasoning over the sample considered brought me to detect more profound causes of problems and potential defeats of startups: two of them are quite common between companies generally speaking, while three of them are more related to the combination of education and technology and its effects.

I recognize the first component of the black box in the team. As it emerged from the data collected, the startuppers interviewed affirmed that differences related to the background, the age and the gender are fundamental in order to leverage the company's performance, but this thought was not confirmed by the analysis of the teams themselves – lots of teams are composed by people who met during the university or who used to previously work in the same firm. As we know, both

[31] Note that the list does not follow a precise order, but it simply writes down a random list, since it was quite difficult to extrapolate numbers and percentages from this kind of answers.

homogeneity and inhomogeneity have their pros and cons but, thinking about the purposes and the future perspective of the industry, I think it is fundamental to try to move to more differentiated groups: dissimilarities enrich all the people gravitating around the startup and, even if their management could be not so easy at the beginning, they tend to lead to more successful results on the long run. Moreover, I would like to underline one of the most important objectives of this set of startups that is the expansion worldwide. A well assorted team, with different backgrounds, personal traits and experiences, presents different mindsets able to see things in bright different ways and to capture slight nuances in order to create an open-minded group and – maybe – to allow to see the bigger picture. The vision must be the same and the division of the roles is needed, so everyone can work in order to reach the final goal.

The second basilar component of a potential breakdown of EdTech tools lies in the inability to set the startup as a value creator able to give something valuable and innovative to customers and users. Lots of companies are developing products and services that have the same purpose but with different features: but what is the characteristic that makes one project preferable to the other, even if the final result is quite similar? What I felt from the research I did before starting this project and then from the interviews was that there are tons of outstanding ideas, but it is difficult for an external stakeholder – who has no literacy or knowledge over the educational technology industry – to understand what is the value added that one company can give and the other does not. Since the market is continuously growing, competition does too, and it becomes fundamental to make people perceive the point of difference from the others because it is not always understandable in plain sight.

Then, problems in the development of educational technology products and in the delivery of the same kind of services are related to the gap in digital literacy between kids and adults – be them educators, teachers or parents. The difference stands in the fact that – for now – the first side is considered digital native and the other does not: children in the developed and developing countries are born with technology and they usually grow up being involved with it in many different aspects of their lives. On the other hand, adults approached technology later and, in some cases, this could turn out

to be a limitation, even if sometimes it is just a matter of the time the learning process takes. Startuppers and technology entrepreneurs should not just focus over kids and their mental processes but – together with this – they should give parents and teachers the tools needed in order to be aligned with the level of technology needed. This is something that should not be taken for granted: people that nowadays have kids approaching the elementary school do not have all the same level of education and the same personal technology-inclined skills and abilities. Since adults are the customers, this is a gap that in some cases could become crucial in a negative way.

I think one of the most interesting reasons of potential failure for the new-born startups in the field, came up to my mind exactly during the interviews. I discovered an important dichotomy that reflects itself the name of the field: the coexistence between technology and education, meant as pedagogy. The discordant results obtained from the interviews led me to think about which one is the real main focus for companies. From the entrepreneurs' answers, it is not clear if, in the long run, the pedagogical aim will be overcome by the technological sphere. For now, the thread is providing a new way of teaching, focusing on new subjects, but every company is working on one specific tool – or game – with a number of features. Looking at a future possible scenario, companies will probably be more engaged in creating platforms: this means the development of widespread accepted software that give the possibility to build a number of different educational game on them. In this hypothetic situation, companies will sell a basilar device and then others – both firms and private – will build their own educational content on it. This will symbolize an important shift inside the industry that could be also seen as a distortion from the meaning of EdTech: if I focus just on technology, am I still part of the EdTech world?

The last component of the black box according to my perspective is related to another dichotomy, the one between the digital sphere and the analogic one. For what I understood talking to people, it seems that digital is taking over analog, gradually replacing it in many aspects. Instead of a contrast, I think this situation should be carried out as a dualism and so the coexistence of two different realities, and not as a choice between one of the two: in life – and so in learning too – digital should not replace the

analogic sphere because analog is reality and technologies able to change the world are usually the ones recognizing the limits of digitalization. Startuppers in the educational world should be the leaders of a movement that seeks for the integration of these two elements, trying to reach a status in which digital is able to value analog more than anything else and, on the other hand, analog processes play a significant role in building hardware and software.

CONCLUSION

Technology already made – and it is also going to make – a difference in our daily life. The developments in the field of education technology will probably keep growing and expanding worldwide, bringing a positive disruption and changing the life of lots of people, not just in developed, but in developing countries too.

The great majority of educators and teachers believe that textbooks will be replaced by online and digital content by the year 2026. But in this wealth of online opportunities for learning, the analyzed Israeli situation showed the need for precautions. As every powerful industry, EdTech does not come without critical aspects to be adjusted: teams need to find the right balance within the members, products should not be the replication between one another, digital literacy should spread all over the world to fill the gaps, uncertainty related to a possible dichotomy between pedagogy and technology should be overcome and the coexistence among digital and analog should find the right level of interconnection. But, even if the Israeli sector is powerful but far from being perfect, countries all over the world should take it as model and inspiration to gradually pursue innovation and to break down boundaries

The future should bring educational technology in more fields all over industries and could be a mean to solve internal differences among countries and cultures. Education should always be leveraged in order to enhance the growth of populations and to overcome problematic realities.

From being the hub of EdTech innovation, Israel have the power to spread this knowledge out of its borders, allowing countries to grow and to advance. The right portion of educational technology tools and the correct application in all the levels of education – from nursery school to university – have the ability to modify the traditional model into a more sophisticated one. In this case, change is not about disruptiveness and denaturalization of a country's culture but integration and development. EdTech is new opportunity for learners and educators to experiment, to find new didactic approaches and to renovate the processes.

RINGRAZIAMENTI

La gioia di questo momento la dedico a mia madre, che è la mia famiglia da 25 anni, la mia guida per la vita. Senza di te non sarei quella che sono, ti devo tutto. La dedica va inoltre a mia nonna che è, e sempre sarà, la mia seconda mamma, e che è convinta che mi sia laureata in International Banketing. Un pensiero commosso va a mio nonno, una delle persone che ho amato di più nella mia vita; so che saresti fiero di me.

Ringrazio le mie amiche per essere la famiglia che ho scelto e che continuerò a scegliere, per il supporto e la pazienza, per la spensieratezza, per le serate passate a far niente ma a dirsi tutto. Con voi è tutto più bello.

E ringrazio anche tutte le persone che fino ad ora mi hanno fatto lo sgambetto: anche se ci avete provato, sappiate che non mi avete mai fatto cadere.

Ringrazio Tel Aviv e le persone meravigliose che ho incontrato durante quell'esperienza: rimarrete sempre nel mio cuore – you guys made my days.

Infine, ringrazio il Professor Micelli per l'opportunità di mettermi in gioco e di abbattere i miei limiti e per la fiducia che ha riposto in me per portare a termine questo progetto.

APPENDIX 1 – STORYBALL (MEIR BITON, CPO)

First of all, I would like to introduce you to our company and our product. We are different from the other companies in the EdTech industry because we sell a device that children use at home or in their free time, so we do not have contacts with schools and we are B2C. We classify our product as a smart toy for learning: it's a screen-off product aiming to stimulate children and make them move outside, alone or with friends. We see ourselves in the middle between education and gaming and we would like to change the way schools act, bringing the old school to something new.

Have you ever been in an incubator or accelerator and have you ever had a mentor?

Of course, we were incubated at MindCET in Tel Aviv and then accelerated at the Startupbootcamp in London, but this was mainly focused over the Internet of Things (IoT). These experiences were so good because they allow to create a sort of community of startups and they make startups meet and create relations. We have also had a mentor and his role was primarily to give us advices and guidance, but then it turned out to be really important also because of his experience in the field and for all the linkages he had with other startups and companies.

So, do you have relations with foreign startups too?

Yes, we have many relations with startups set abroad and I'm talking about complementary ones.

Are you also part of a cluster? I mean, a sort of Silicon Valley of the EdTech industry.

Yes, kind of. I feel this is still a small community but, at the same time, it's really powerful and able to retain and spread lots of knowledge.

Which kind of impact do you think you are producing over the society?

It's difficult to say it right now since the product is not on sale yet but just in the pre-order phase but we definitely want to see what will happen and in case change the technology we are relying on. Anyway, our goal is to make kids move and create relationships with other kids, make them more social and learn all together, removing them from tablets. We don't know if this will change somebody's life, but we believe that there will be an impact that will make a difference.

What do you think about the norms, regulations and legal challenges affecting the industry?

I think the most relevant aspect to consider here are the privacy laws and the difficulties companies face to be compliant to these norms. Many companies I know still collect that and this was illegal even before the regulation was approved: for example, the world of gaming was a "wild west" on this aspect. I do not think that regulations change much, they just make startup be more organized and be able to send out reports of the data collected. It's not blocking at all our business and I think in general laws are good to make clear that everyone should be compliant with these things.

Do you think that aspects such as gender, age and the educational level are affecting somehow your company?

In our company we have less women – 2 out of 10 people – but unfortunately in Israel and in the startup world there's a difference between male and female and usually there are more males running a business and being CEOs' and even working for startups and being employees. Also for the race, it's usually more common to see white men working for startup because is not such diverse country regarding those aspects and the society is more closed: for example, Arabs have their own societies and Israelis have their own ones too and the other foreigners are pretty much left behind on this. We are not so much happy about the fact that there's not so much diversity, but this is the reality and has been the reality for a long period of time. Maybe things will change in the future.

How long have you been a team? Are you "just a team" or friends too?

Yes, we are friends. This is not something working for other companies too, but for us I can say that ours is not a "big boss" company, so there's no distance between employees. We are three founders and we work together since high school: we were friends and we built the team by adding other friends of us – everyone brought inside the team the people that he thought were more suitable and were the best for what we were doing. I think it's better to have friendliness between co-workers, even if for everything there are ups and downs. Ok, we are friends, but there's also a hierarchy. And this combination makes things easier when we think about solving problems between us or managing conflicts.

Which kind of relation do you have with the early adopters, if you have ever teste your product with them?

Testing is an ongoing process. We always want feedbacks from people. We have a beta-community that tries the product. The product is going to be sold on September, so we are going to know something about customers soon, but for now we have all the data collected by parents and children who participated to our tests. For now, it's too early to talk about the relationship with real customers and users.

Where were they based?

Most of them are not in Israel but in UK, US and Europe. We are not focusing on the Israeli market: we have a very limited content in Hebrew, so our startup is not very much local.

But do you think they will fully understand the potential of your product or do you know there could be problems related to this?

This is hard to say. We basically invented something new for kids, a new interaction. We believe they're going to love it because we saw from the people who tried it that they loved it, but we cannot have a clear idea until people will start using the device.

What do you think about the use of social media mainly related to marketing, communication and advertising?

This is one of the best ways to do marketing. Social media are good because they allow to have a direct contact with the community. Many other startups that have relations with schools do not think how critical the use of social networks is. We rely on Facebook, Instagram, Twitter and LinkedIn.

Since your product is so different from the others, do you already have direct competitors? If yes, what do you think is your point of difference from them?

Yes, we have. A point is that we are screen-free so the engagement with the toy is not based on a screen or phone interaction.

How long did it take you to come up with a solid idea or an MVP? and then, how long did it take you to create the product you are going to sell?

Before the pivot, we started by developing smart balls for physiotherapy: we had a prototype and we tested it in hospitals and adding series of gamification and

physiotherapy process smart-ball gradually became more playful. It started with a ball the patient had to squeeze or shake a few times so the therapist could see their hands' abilities and we made games for this. Then, it take two years to pivot, to shift to Storyball and to change the product into what is now: now the ball have sensors, you can squeeze it, it can talk to you, it could have different faces, it gives you a reason to do the game and to practice.

But what if the market would suddenly change its needs? I mean, do you have a plan B?

Well, I don't think the market will change its needs because this is a generation program for us. In fifteen years, the problem will probably not exist anymore or it's going to be different; but, right now, the point is that kids are in front of a screen most of the times: we cannot know if the problem will disappear but maybe a different solution might appear. Just to make an example, the iPhone is used anywhere and anytime. We are trying to give kids an alternative.

Do you think families can afford to buy your product?

Every company has a strategy and I think that if you try to make your product affordable this is one of the best reasons for you to go on. Ours is not an expensive product: we sell it for 59$ so it's relatively aligned with the market price so it's not cheap but reasonably affordable if compared to other smart toys. It also depends on your target because if you sell something to schools, you could have problems in searching the perfect pool of schools willing to buy your product and also you could have problems related to the software and the technology schools use because they usually remain stuck on one technology for a very long period of time. We are selling something to parents that is much more a game than an educational device, so we need to be competitive and look at the other toys and at their prices.

Do you think people are aligned with the level of technology and innovation you are providing?

Absolutely. It's not something they cannot grasp but it's something approachable. It is basically like playing a game on an app but the remote and the control of the app is different. The mechanism is based on games and records you are familiar with.

But are you more focused on the technology and its improvements or on the creation of a new form of pedagogy?

We have everything inside the company. We are more focused on the tech and product side but because of the background of the people working for the company – engineers, content writer, developer.

How long did it take you to get the first funding?

Getting the first investment is very hard and it usually comes from friends and families. Even if you are really great, the people helping you at the beginning are the ones who know you personally. The first investment allows you to get an MVP and, once you achieve this, you start going to angels and to your community, but there could also be institutional investors. Our angels are mainly located in the UK. For the next stages, we expect less angels and more corporate investments.

What do you stress to convince investors?

At the beginning you have to "sell the dream" stressing that your product is going to work. Today, for example, we give the investors our product saying they can try it out themselves at home and this is the thing that usually work the best.

Since you are going to sell the product on September, you already have to see the revenues.

Yes, the product is in the pre-order phase. We've already sold over 2,000 storyballs.

Do you have a business model and a business plan too?

Yes, of course we have both. The business model is based on selling the hardware and the content and so on digital and physical content since we have different characters that can be bought. The business plan is more a forecast based on what the other companies sell and achieve. We are also searching for partners for new contents' creation because it's really hard to get a content and staying afloat.

In your opinion, which are the three main factors that can lead your company to shut down?

I can say maybe the market, the competition and copying.

APPENDIX 2 – ETON.NEWS (ELAD SHALEV, CEO)

Can you please describe your product? What's the goal you want to reach while running your business?

We started from trying to improve the writing capabilities of the children today. We saw that today the digital world is made of very short sentences and words: kids understand each other but you cannot write an email, your resume or your speech in that way. You need to have some sort of writing or language capabilities in order to get to the job market. We constructed a journalist platform for children where they can produce news and write stories, so also creative and critical thinking are involved in this process. Actually, all the principles listed in the OECD 2030 for Education report.

Where do you see your business in the next five years?

We hope to be already abroad, selling our product out of Israel. Of course, we hope to have a more developed product for teachers: for example, creating contents through which teachers can teach and can automatically check what kids wrote in terms of spelling and grammar.

Do you have connections with foreign startups?

We participated to a boot-camp in London and there we met so many startups from all over the world. But we do not have specific connections with them. We are more stand-alone even here in Israel.

Which kind of impact do you think you are producing over the society?

It's very basic: children today are less involved in talking, writing and communicating. With this tool they can express themselves and share their stories. Try to imagine your situation, I mean, you've started thinking about your thesis, how to write concepts, what's going be the subject, what's going to be the text. So, first of all you think, and curiosity is the core point. Children today are not curious and if I think of when I was a kid, I remember my mind was continuously working, I was willing to know things and to know how different stuff work. Our product is aiming to bring curiosity back to children – how can I take this picture, what is the most important subject I can talk about, how

can I write this sentence. You can learn how to write a code, but you still need language to be able to express yourself. This will help them for the future.

What about norms and regulations?

We didn't have problems yet here in Israel, but we do not know how it works in foreign countries. The schools can buy our product and use it and we are not facing any problem right now. Since we are not keeping and disclosing any information related to children – there's nothing public – and everything remains in a close environment, such as the schools, we do not have problems.

Do you think your age, your gender and your educational level are affecting your business somehow?

Actually no, I mean, we all have had great experiences before deciding to start this business. In the previous years we created lots of connections thanks to our jobs and I can't see something negative in this. This is quite true for all of us, we are more or less the same age, we met during our previous job because we worked together and now we are friends too. Even if there's this close relation between the three of us, everyone has is precise role: I'm the CEO, there's the responsible for marketing and sales and then the one for R&D. So, usually, there is no conflict but if something arises, as a manager you must think and take a decision. We have precise roles and each one knows what it should and could do.

What's your relationship with early adopters, if you ever tested your product with them?

Of course, we tested the product with teachers inside MindCET. MindCET ha a specific sector called TEAM that is an early adopters community made of educators: 17 teachers used our product and we had a very good feedback from this experience. We didn't test the product abroad because the content is just in Hebrew, but within one month we will have other languages available so hopefully we will start testing it abroad too.

And how their opinion influenced the final product?

The product was pretty much good to them, so the final one didn't change much but we learned a few things.

Which kind of relation do you have with schools and then with teachers and kids?

Since the company is new and still small, we have a good relationship with them, it's very intimate and close but, since we are hoping to grow, we are planning to have a customer service and people managing this aspect. For now, it is very one-to-one, they can call us anytime even at 10 pm.

Do you think they fully understand the potential of what you are doing and providing to them?

I don't think that we as a company are understanding all the potential of the product. We are still learning and we are learning from our customers and users too: they are doing things with the product that we didn't imagine before. We thought about a purpose for our product but sometimes it happens that what you have created is used differently by the users. It's not only a newspaper because you can use it as a project-based learning or as instant news for the students. When we start a new collaboration with a school, we provide to it a basic document in which we explain the successful stories of other schools and we give it a way to do the same, but then we always realize that every school is implementing the product differently. And this is good because it allows to spread their knowledge and ours as well. Customers and users are helping us to understand the potential of our product.

What about social media?

Oh, we have Facebook, Twitter and Instagram but we are not using them properly. Our aim is not just to use them for advertising and get people informed, but also to directly sell our product and make it more visible.

Do you have direct competitors? And if yes, what's your point of difference?

Not really, but there are other platforms such as Facebook that are not direct competitors, but competitors anyway, even if they are slightly different from us. So, it's difficult as well to talk about a point of difference toward another company.

How long did it take you to come up with a solid prototype?

It took us about one year. Then, of course, we can say that we are currently going on developing the product.

So, your aim is to go global, right? Which are the steps you are planning to do so?

We are translating the format from Hebrew to other different languages and then we would like to do pilots in two or three countries, like we already did here. We'll go school to school to find early adopters and test, but this takes time and we are trying to find publishers that will take the product and sell it in different countries.

But what if something would go wrong? Do you have a plan B?

Plan B for us is to close the company and actually go to work and trying to find a job. If the startup will not achieve its goal, the only path I see for now is its death. But another plan we would like to implement is to make a little shift and create a second similar product to be sold to other companies and organizations. You know, many companies have few buildings or headquarters and the most important things are employees: nowadays companies need to be transparent to them because they want to be involved and informed about what is going on. Here at MindCET, the 80% of the workers do not know what the new products are, so how can you keep them informed? Maybe with a new platform and a virtual newspaper: they can use it to share things they like or plan trips together, everything aiming to create organizational culture.

Do you think the product is affordable to schools? And what about the level of technology you are providing to them? Do they know how to manage it?

This is a problem because usually from 20% to 30% of the schools today have money problems. According to the technology, the majority of the schools do not have problems but some of them do. It's a very easy product, it's not tricky or complicated.

From what you are telling me, I can understand you are more focused over the pedagogical aspect of your product rather than over the technology associated to it.

Yes, we are aiming to develop and improve the pedagogical side, but we want to achieve it through technology, even if technology is not the matter here and this is why the product is so simple.

How long did it take you to have the first investment?

We have never got an investment, but we started everything with our money. At some point you need to, but you also have to create a market and have a market share to make investors interested on what you are doing. For now, our product is really new

and we need hundreds of schools using it and to reach a certain level of revenues, so investors will start to be interested in our company.

So, what about the revenues for now?

We have revenues – not that much – but we have. We are in about 30 schools and it's a good starting point. We are selling annual licenses for each school and the price vary from 1,000$ to 1,500$.

Thinking about you company, what do you think are the three main factors that could affect positively or negatively the success of your company?

We can say first of all funding problems and so finding investors interested in our product because without investors and money is really difficult to go abroad, travel and doing pilots. Then, also marketing: we need to find the right process for it because most of the potential customers do not know us, but they are looking for some solution to their issues. In the end, we need to find much better solutions for teachers because they still do not see the product as something that will help them with teaching. We need to find a better pedagogical value associated to the product for them.

APPENDIX 3 – PLETHORA (EFFI BARUCH, CEO – SHIMRIT PENTCHACK, HEAD OF PRODUCT DESIGN)

First of all, I would like to know something more about your product.

Our product is focused on teaching children computational thinking, algorithmic thinking and logic. It's basically a game, but not a gamification of a learning process. The games were developed at The Whitman Institute and at MindCET. We can say it's very similar to other games around – like CodeMonkey – but we do it differently by presenting other challenges to children. We would like to make kids more fluent in computer science, but there many other sub-goals going with this. We really would like to spread around the world and to give every kid around the world the opportunity to understand the logic from an early age because it's something really important in our days and it has a relation with all the aspects of our lives and not it's not something related just to computers and science thinking. It's vaster.

Where do you see your business in the next five years?

This is a tough question. Basically, we see our product being spread across the globe. We see our business becoming well developed and used here in Israel but also in the Eastern World: in a year, a year and a half, we would like to see our business in India, Korea and China – Asia in general – and then in the US and in South America and we can say around the world. For us is easier to go ahead and work with the eastern countries because the west has lots of tools and games but also a lot of bureaucracy and laws. If we will be able to show that what we did in Israel can be made also made in other places, then we will have a much easier approach to the European and American markets. The point is to make people try our product, to keep in touch with market dealers and to build a sort of interest around the product. We also join international meetings to make people informed.

Have you ever had a mentor?

No, we tried this approach at MindCET, but it didn't work.

Do you feel like you are part of other industries besides the educational one?

It's not just the educational world at all. Actually, this is what we love about our work: the fact that we work with all kind of disciplines. We are definitely part of the hi-tech industry in Israel because we are introducing innovative technologies and, for example, the other employees can be part of any other of those companies because of their background. But we are also involved in the gaming industry.

Do you have connections with foreign startups?

Of course, we have connections with other startups and this is very important in order to understand if our product is valid in terms of the market and the users and so the children: there's a world out there and the play all sorts of games. Ok, our game is an educational one and not something related just to free time we can say, but it's part of that world too. In Israel there's a cluster for this and this means more connections. We are starting to build some international connections mainly in Asia. And here in Israel we meet a lot with other companies during conventions and meetings specifically organized for our field, even if I have to say that this is still a small market.

Are producing some kind of effect over the society?

In the future I hope so – like in five or ten years. But, for now, we are definitely not in the position to say this: we are appreciated but we don't have enough users. We are continuously developing our product as most of the other startups, but currently we have a product that we are going to sell later this year.

What about the team? And what about your point of view on the fact that the startup world here is more related to men instead of women?

We are in four – three men and one woman – and of course the business would have been different without them and every one of us has his or her background. We are just co-workers but there's a good vibe among us and when there are conflicts, we simply talk about the problem and we get to a conclusion. I think the diversity of the team is extremely important and creates a more interesting team. It's really a thing that this field is more related to male entrepreneurs and startuppers, but I think it's really good that I'm a woman and relatively young compared to my crew. We also have a high rate of girls playing with our product and this is exiting because usually girls don't like playing logic games and they tend to think they are not good enough but it's just because they

try to be really good in what they do and if they are not good enough they will leave that subject and shift on something else. What I'm trying to express through this game is that everyone is good, we don't compete and we work together. Also, the design of the game is not something created just for boys or for girls – there are no guns or robots or pink stuff – so they can equally play and feel related.

Did you rely on early adopters, customers and users?

We tested the product mainly in Israel but we also tested it in Vietnam in a classroom in Hanoi and the engagement of the students was crazy, we received really good opinions. Last year and early this year children were exposed to our games and then some of them became users, while others didn't. So, we can say there's a group of potential users that already knows us. Now there are 60,000 children in Israel playing our game. Customers are parents and schools but also organizations, for example, the Ministry of Education too. We usually keep in touch with them, talking and listening to what they want to say. We did tons and tons of testing and we are continuously doing it: we go inside classes using our game and we simply observe children playing and listen to them. Sometimes we also do kind of interviews to have a deeper understanding of what needs to be done or changed. Teachers here are crucial because if they do not understand what they are supposed to teach, then they wouldn't teach in the right and proper way. For what we see, kids are very advanced if compared to teachers and they are actually teaching to the teachers and this is great! Customers understand the potential of our product, not in terms of business potential but on the educational side. On the other hand, kids face some difficulties: at the beginning, every game was combined with a lesson, so everything was learned had a background too; we did lots of changes and testing, so the kids started to learn by their selves. There's a tutor just in the first level and then they just keep running. We also have to manage teachers, and this is the most difficult part: it's challenging and they usually think algorithmic thinking is something too complex for them but it's not. we are trying to explain teachers we are working with that they don't have to be afraid of this subject because everyone can do it, we have logic inside our system, our minds.

Do you have competitors and direct competitors right now?

All the companies dealing with computational thinking can be considered as competitors and moreover we consider competitors all the other startups in the EdTech market. What makes us different from the others is the concept that made us start the business: the game, instead of teaching computational thinking using coding, uses a different strategy. Our product is special because all the other games give the user a certain amount of viewing the system: for example, in most of the games I need to see the object in order to see all its attributes and characteristics, while with Plethora you don't need to touch the object to understand, everything is in front of their eyes and in this way it becomes easier to understand what complex system is. Our product is not "object oriented". Trying to explain our product is really more complex than playing it.

What about social media? Do you want to implement something?

We are working on the possibility that kids will be able to create their own levels and then share them with friends and, from then on, they could also collaborate and work together. Talking about traditional social media, we are more working through our personal profiles on Facebook, LinkedIn and Instagram. We also have a YouTube channel where we upload all kinds of videos from kids: some kids doing the more complex level film themselves while trying to deal with it and then they send to us the video to be uploaded on the platform.

How long did it take you to come up with a prototype, an MVP and the product you are currently selling?

We made a prototype for every feature we have created to test it. MVP is different because is a sort of basic product made off of different features. After 7 to 8 months of work we had the MVP with two or three levels looking really different from what we have today. To create the final product, we spent other time and we came up with 91 levels – now we have 250.

Do you have a plan B to follow, if something would go wrong?

When you are a startup, you can barely focus on what the market needs right now so it is almost impossible to aim for anything different. Making something different is not something written in our business plan. Moreover, we are constantly testing our product, we have a constant relationship with our users from the beginning of

everything, even when we were in the research phase. Then we also try to keep the relationship with other companies. So, we are kind of prepared for a possible problem or issue.

Are you more focused on the technological side or the pedagogical one?

The technology is supposed to look simple, nice and playful. But it's not easy at all. We can say we are in the middle between these two sides.

When did you receive the first funding?

Plethora began with MindCETeX: we went in Yeruham for six months and then we extended it to one year. This research program gave us a budget for six months for R&D and, after this, we were able to show to our business associates that we produced something valuable that could be actually sold. And then we received other money from the Weizmann Institute of Science, but it was not an investment. We are currently developing everything with our personal money. To attract them we would definitely stress the characteristics of the team the people working for the company and the product itself as something really different from the other products and services available in the market, so our competitive advantage.

Which are the three main factors affecting the probability of failure inside your company?

One of our main problems is that computational thinking is still not something that is taught in schools. Around the world people are starting to understand that this is an essential, but the problem is that if the world in three years would decide this is not important, then we would have some problems for real. Another crucial point is disharmony because everyone of us has his or her sea of knowledge and we have to work together unless it would be a disaster. In the end, we can say explaining people the importance of computational thinking: people usually want to know something in a really direct way like "is Plethora something that is going to help me with math or make me improve my skills with science?" and it's a bit complicated because throughout the interviews we can understand how our product is helping our users but we have to explain people why since the product is not helping them learning how to count 5+5.

APPENDIX 4 – INFLOW (SHAHAR SHIDORSKY, CEO)

How do you classify your product?

It's meant for higher education, not only universities but also pharma companies and aggrotech ones, so research industries; basically, for all the companies we call knowledge intensive and so the ones that rely to scientific publications. Maybe in the future we will have something suitable for high schools, but for now we don't.

And what's your mission?

Our mission is to improve scientific knowledge worldwide by creating credibility: me and the other members of the team all come from the research world and there this is huge problem. There are a lot of publications especially in the biomedical field but not all of them are valuable. Research means spending lots of time and money and people need to know if a paper is reliable or not because this improve the overall quality of the final result.

Where do you see your business in the next five years? What do you mean by "worldwide"?

Yes, we really want to focus on countries in which research is well developed, such as Europe, USA, Latin America, Japan, China, India, Russia. Unfortunately, there's not much research in Africa but, if something would change, then we will definitely go there.

Do you think your startup is connected to other industries besides the educational one?

Yes, of course. Actually, we are not a typical education startup because we are mostly focused on research, so we are connected to pharmaceutical, agricultural technology and biomedical devices in some cases. Everything that has to do with scientific publications.

Now I would like to ask you something more about the people involved in your business as a whole. I saw you are just three. Do you think your gender, age and educational level are affecting your business? And what about the relation between you three?

Definitely our educational level is affecting our business. About the gender, I have to say that we tried to include a female co-founder, but it was unsuccessful. Anyway, gender is affecting the business because we are all coming from similar paths and mindsets, so

it somehow has influence over the startup but I cannot say how big this influence is since we are all male, maybe we will know when a new and female component will be hired. By the way, we studied together at the university, so we are friends too. We usually take decisions together: when we talk about major decisions, our decision-making process is based on convincing the others about our personal ideas, even if sometimes it' extremely difficult since there a lot of uncertainty. For minor decisions, we usually rely on the specific competences of each one. Everyone has a veto right, of course.

Have you ever tested your product with early adopters?

We have studied a pilot. Testers' opinion is extremely important, one of the most important things you can have, but you should have a diversified group of early adopters in order to have a big pool of data. Then, people have different needs, so you should not go too specific and change your road map just because one of them has said something. Currently we are in a very early stage and we have just one early adopter, but we want to expand this test to about ten more people in the next weeks. The test is conducted in Israel, but I wish to find someone outside Israel too: we are in contact with some guys, but it's too early.

What do you think about social media?

For now, we don't have them, but for the future I think we will rely on Twitter and LinkedIn because these are the ones widely used by academics. Facebook, for example, is not something we are going to use.

Do you have direct competitors right now? And what do you think is your point of difference from them?

Yes, we have several actually. Some of them are other startups, but others are big companies too. The big companies are doing the same things they did 50 years ago about evaluation. But what we are doing is the next step: we try to give a better understanding of the research view. Small companies are doing something similar to what we are doing, but they are in a really early stage, so we are not worried about them.

Do you have a plan B for your startup?

We don’t, but we do have the ability to change if we need. You cannot plan something for every possible scenario because you would end up with tons of different possibilities without focusing on the development of the product. We are planning the most reasonable outcomes from our knowledge of the market and if things would change, you change your plan accordingly.

What about the technology involved in the product?

It is very easy to use, but at the same time it is disruptive. Technology is just a tool for us: what we are providing is neither technology nor pedagogy, but a decisional aiding tool and so a tool allowing you to decide if you can rely on something or not. we do not teach people something, but we help them decide.

What would you stress with investors to convince them?

It’ s really difficult for investors to decide to invest in something related to the academic world. We would like to make them understand that there is lot of money in this field.

Which do you think are the three main factors affecting the probability of failure inside you company?

I would say market adoption, coherence of the team and speed of development.

APPENDIX 5 – CODE MONKEY STUDIO (YISHAI PINCHOVER, COO)

We started the company at MindCET at the end of 2013, so nearly six years ago, and the vision was to create a game-based product that allowed children to learn the elements of programming and computer science through the game. The idea was not completely new because at that time the awareness about this was starting to form and there were already some nice apps trying to do computer-based learning for programming. Also, we tried to extend the product vision to some kind of game existing in the late sixties called Logo, developed at the MIT, and it was the first programming language for education. So, computer programming languages existed for a few decades before, but in this one they designed the language in order to allow kids to learn this programmatical thinking through some graphical word: they took a movement in a two-dimensional plane and that was really successful at that time but learning computer programming for kids – elementary and middle school children – was not considered as something that could scale very widely. But when we started our company there was a sort of awakening of data awareness around the world as something that could and should be done. At the very beginning we were focused on creating something engaging and fun for the kids where they can play and at the same time learn, and eventually also becoming able to create something. We changed this idea because we didn't ask and answer the question "is this going to be a product for schools or to use at home? Who is going to pay for it?": these questions were left open for quite a while. Thinking about the last year or two, the company is already quite focused on selling the product to classrooms, in both private and public schools or even a private after-school company – we experimented a lot of different alternatives and we came up with this path. In October last year, the company was acquired and the company that bought us is an after-school company in China and its goal is to run after-school private learning centers for children there and they do it with about 1.5 million kids every month physically going to their center. They don't go out of China and for them is strategically fitting their goal to have acquired a company like Code Monkey: we continue to operate from here, but we also have a few employees in the US. For the future we would like to turn our product

from a few coding courses or games to a full-curriculum solution that covers a wide age range and the needs of the school system, with all the materials for teachers, instructors and so on.

So, what's the main goal while running this business and creating this game for children?

Initially, when we started all of this, the personal goal – besides having a successful business, fame and making money – was big. Every one of us left his carrier, two of us were really happy the jobs and the other was finishing his Master studies. So, it really took more than just a business opportunity: we believed that this could be capable of transforming society. I think that when a technology like this becomes available, it creates more access to children everywhere, to acquire tools to help them in their future education and carrier. And because it is available online and because the price is not very high – the license we sell to schools goes from 10$ to 25$ per year per student and if you compare it to the money you spend for a private tutor or for an after-school program there's a completely different price, especially when you do projects with the government as we did here or in Argentina, where the central government pays for all the students to get access to specific programs. Working with the Ministry of Education here in Israel, we saw some amazing examples of schools from social and geographical peripheries and other under-privileged areas where students reached incredible goals that no one could even imagine possible.

And what about the future?

Now we are shifting a little bit our focus because when we were working as a startup, we were quite independent as founders and our duty to the company was to create value, so we've chosen the path allowing us to succeed as a business. We are now part of a bigger business and clearly the goal of the board of directors or whoever is managing is to create value not just for Code Monkey as an independent business but for the company as a whole. My hope for the next years is to become a top and leading brand for teaching kids to code in the US school system – and we are receiving new funding from China in order to achieve that – and in the long-term we eventually will lead the sector in other countries as well. In Israel we are clearly number one, so there's no reason not to succeed in that direction.

Which are the industries you are part of?

We started as a gaming company, but we are not like this anymore. The product we are creating is a game even if the word "gamification" doesn't really describe everything in the proper way: we designed it as a game from the bottom-up and some of the product management is really the product management of the game such as the creative side, the design and the technology. But in terms of the industry or the markets we are not part of this industry. We are really part of the educational industry and in contact with educational companies or with some educational division of companies. So, this is definitely our ecosystem.

Do you have connections in other countries besides Israel and China?

In terms of startups, this is a challenge. Part of my roles, until about one and a half year ago, was forming partnerships for Code Monkey, some of them were really easy to conclude, some other not, and now we can say we have between 20 and 25 active partnerships. The thing is that when a startup cooperates with another startup the all risks you have to face while running one startup are multiplied and we are always trying to reduce risks, so you have to take it carefully. We collaborated with more established companies but with some exceptions too, in order to create an ecosystem, relations and mutual help.

But when you were a startup, did you feel like here there was an EdTech cluster?

We were and we still are part of the community and we benefited from this and from MindCET too, for the program itself and then also for all the companies involved in the program. We can definitely say that Israel has its own Silicon Valley of education, usually called Silicon Wadi and based on cyber, biomedical and in general hi-tech, but EdTech is something really different. I think in Israel the field is not mature enough, it's too early.

Have regulation and norms ever blocked you at the very beginning?

This is an ongoing process because the situation gets more and more complicated when you start growing. When you are small, nobody really pays attention, so you can take thing very seriously but also less seriously too and this usually does not prevent you from doing pilots, making the first sales or getting attraction. And then the more you make noise and get into the radar, the more you will face barriers. Then, you also need to

conform to the country you are in, for example, in the US there are endless laws regulating also the relations with other countries, so you need to keep attention high.

And what about the team? Do you ever feel that gender, age end educational level of the founders affected the way the business was going?

Age and experience definitely affected us because, some years before we joined MindCET with this idea, two of us tried the something very similar. We experimented several options for a whole year. The product was not right for the time back then: maybe we could have survived waiting for a more mature situation and trying to get an advantage, but we decided to abandon it. Looking back, I can say we were to young and not experienced to run that kind of business. There are lots of stories about entrepreneurs arriving at the right moment with the right idea or having the right character to be able to it with much less experience. There's not a unique answer, but for us experiences counted a lot and I mean working experience over the university ones. In terms of gender, there's a gap existing not only in the entrepreneurship but in the whole industry if we consider hi-tech; but the trend is changing and we can see more and more women, not just in specific roles like HR or administration, but also as chiefs. Now we are half and half and we didn't do it on purpose, we just took the right candidates.

How long have you been a team with the other co-founders?

I know Jonathan (CEO) since the first grade – that's more than 30 years – and we have been really good friends in the elementary school and through high school. We have done things in partnership together outside the professional life and inside too: we ran a non-profit together, related to youth and education, and part of what we are doing today was born at that time. The other co-founder is his brother. We are all emotionally connected to what we are trying to do here, obviously not everybody is going to think the same because people have different opinions, characters and risk profiles. It was not an easy journey but, in a founding team, maintaining good relationships is an aspect that could be a success factor or risk factor when you try to build a company.

What's your relationship with early adopters?

Some of them are happy customers until today and some dropped out at some point. At MindCET we learned the importance of planning a product with a very close connection with early adopters and testing users. Then, we also relied on other frameworks from Pearson that taught us the importance to do pilots all over the world, for example. I also remember I was in San Francisco in 2014 going from school to school to look at the product in action and to talk with the kids and the teachers. It was not simply about collecting data and reading feedbacks but creating a human connection with people. And in this situation is difficult to come up with numbers explaining things and allowing you to understand on which variables to focus on: it's challenging but really valuable. From another perspective, there's a company called Monday.com that is an Israeli unicorn born in 2013. We started using their product, we were actually one of their early adopters and we saw their product evolving into something huge and I remember how they were really listening to us and paying attention to our needs.

And are you still doing the same with users and customers?

We are trying. We have a customer success team made of two people who are there not only to support but also to maintain the relationship, to listen to customer, to nurture the interaction with any kind of customer in order to make them happy. We also have something called "The Ambassadors" and they are sort of champions, happy users, a group of 40 to 50 people in the network helping us spread the word. You need to have a good relationship with customers in order to be able to build something like that.

And then also what about the potential users? Do you think your product is well known to them or do you think you could do something more?

We can do a lot more. I think we did a few good things about awareness. Luckily, there are places in which a few organizations are trying to lift up high quality educational content, whether for commercial or other reasons. We had a partnership with an American company called BrainPOP who has lot of data user-based in US schools and they featured our product: there was no money exchange but we offered them some content and they offered us some exposure and then people started to know use and using your product. Another example is Code.org, a non-profit organization specific for coding. They usually select valuable companies and push them upwards: we got lots of

attention and traffic from them. But there's always more you can do. You have lots of anonymous users and this does not mean you can be in touch with them because if they are really anonymous you don't even have their email. For a long time we tried to identify if there's a critical point of usage of our product, we tried to target those people and to get in touch with them, also because many companies are approaching in this way for sales and marketing in the US and this is working for them, but it is not as easy at it sounds. And this is a different approach because we are used to receive mails and calls from interested customers, but the bad side of this is that is really difficult to understand how to generate more relations because it's difficult to understand the process to create awareness and make people decide to buy you product.

What's your relationship with direct competitors and what's your point of difference?

Each one has its own angle, but it changes over time because it's something dynamic. I think we have always been different in the way we emphasize the text-based coding and this is specifically related to education: many other companies in this field take a design and visual approach, while we first focus on text-based. This was challenging at the beginning but the good part of it is that it's more similar to the real world. We also had a game approach: we decided to build it as a game from the very beginning, trying to reach the same level of engagement. In every game there's a learning process.

At first, how long did it take you to come up with and MVP and then with the product you are currently selling?

The first prototype was developed inside the incubator and it was prepared in a weekend, even if it was just to demonstrate what kids could do with that product. The MVP took about 6 months – from October 2013 to April or May 2014 – and the first end user was in September. For the final product is hard to say because I don't think we have a final product yet.

What about the technology involved in your product? Do you think people can understand it and how the product works? Have you ever seen some problems related to this?

Yes, we saw lots of problems. Kids usually do a really good job at the beginning but then they start facing problems because it becomes more and more complicated, not

because of the technology but pedagogy becoming increasingly complicated and so the material you are teaching and educators are not able to overcome these problems. So, today is clear to us that one of the keys to solve this issue is through professional development. And if we really want to construct a full curriculum then we need to focus over teachers and educators too.

What about the first funding?

None of us put his personal money in the business but each one of us had passed a time in which we were gaining 10% of the market salary working on this business and then we gradually climb up, so this is kind of an investment you do in your company and for your own capital. The first investment was a pre-seed round of 200,000$, thank also to MindCET, friends and families who participated and professional friends. Then there was a bridge and a seed round that happened around one year apart: but if we look at this together, the money were coming from the same investor who saw the company evolving, he was happy about this, he was willing to keep his share and in order to do this he put other money in the company. There were some professional angels in this and also some strategics who had not just the interest in making money but also to be part of the company for some commercial goals in other countries such as China, Japan and India. All together, they made around 2.2 million dollars – pre-seed and seed together – and the last funding source was from the Israeli government and from di IIA – Israel Innovation Authority – who gave us grants for R&D specifically: they do not take company's stocks but you have to pay them royalties and we are still paying them and there also other obligations, for example you are not allowed to take the intellectual property out of the country or to stop doing your R&D here. The last part is that we are trying to generate early revenues and use them as part of the investments. With the first round, we went pretty far compared to other companies. And then in 2017, the year before the acquisition, we were already profitable which is also quite unusual in EdTech and in startups in general.

And now what you usually stress to keep the level of attention of the investors high?

Now we are not involved we investors and we have one single owner, even if they told us to consider them in the future. But I'm sure that if in the future we will have the need

to find money, it would be pretty challenging. For now, everyone of us has some goals to reach and we also have an incentive system related to this.

Last question. Which do you think are the three main factors affecting the probability of failure of Code Monkey, looking back at when it was just a startup?

One is absolutely the human factors and the interpersonal dynamics among the founders of the company, but we can extend it to the early team and the atmosphere between people. Then we can say timing because, as we did, you can try in a moment, but you can fail and if you try again later with a very similar product it is possible you are going to succeed. And then the relationships between the company and the outside and so the accelerator, the government, the other startups and companies: you need to maintain a long-term vision of being in a close and meaningful relation with the ones who are affecting you.

APPENDIX 6 – KIDI STARTUP (AVIRAM MIZRAHI, CEO)

We already talked about your product, but I would like to know something more about it.

Right now, the product allows students from age 5 to 10 – and so we mainly focus on elementary school – to create whatever they want to create on the platform. They start with a blank space and they have many different options to create their own map and they can decide whether they want to go on with a certain team or a certain game style and they also have the option to choose the character they want. During the game they collect coins and then they show the final result. Kids create everything so it is all up to them: they have the option to build educational games, puzzle or whatever.

So, are you creating one specific technology and then every kid can consequently create his own game?

It is a platform. There are three different parts: the first one allows students to design and code applications and games for mobile and computers and this is a collaborative studio and environment that means that different users can build a single project together, like Google Docs for example; the second part is PBLAI engine and so the Product-Based Learning so, for example, if you have a team of two, someone has to manage them.

Where do you see yourself and your company in the next five years?

Of course, making it a market leader, after a successful IPO[32].

Do you feel like you are part of a group of companies here?

I have a place to stay here, I can talk to many people around here and in the industry, but we really do not have time for that. I do not think we are being affected by other startups but, on the other hand, we are definitely affecting other startups. This is a development platform where you can create different kinds of applications, for example you can build newspaper for schools, math and logic games: so I can say we are going to

[32] Widespread abbreviation for Initial Public Offering, that means an offering done to the potential investors of a company's shares as a conclusive act of a bigger project leading to the quotation of the issuer in one or more markets.

disrupt the industry even if we have competitors such as online platforms providing tutors for students, but we have AI tutors.

So, do you think you are going to produce an impact over the society.

I think we are already doing this. I can say this because of the feedbacks we receive from students, parents and teachers simply on Facebook.

What about the norms and regulations of the whole business? Do you feel like you are over-controlled?

There are guidelines we are concerned with, especially looking at the users' privacy field because we work for and with kids. For me it is not something bad because regulations are a guide for us and they help us knowing we are doing stuff correctly and in a safe way for kids.

What about the team? Is it just you running the business?

There is mainly me and then I have Evan, my co-worker who started with me to build up the product, Mitri who is the back hand developer and deals with the application development, Vladimir and Anton, the front hand developers and the game engine developers who are building the studio, Christian is our CTO and CFO, then Ewan – our intern, he is supposed to help in many things but mainly approaching the US market, looking for new opportunities, translating the website, making the platform durable for elementary school kids and targeting – and in the end a new guy joined us and he is a game developer who is taking care of the multiplayer aspects in our platform. Adi is taking care of the marketing aspects and Tamar who deals with the communications with the teachers.

Do you think your gender affected the way your business is conducted and the success of your business? I saw it is really more common here in Israel to meet men developing EdTech startups instead of girls.

We would like to have more girls in our team.

What is the relationship with your co-workers?

We are just working together. We are sharing the same ideas about the product and the values we are bringing to the world. We interact a lot, but everything stays inside the working boundaries.

Considering the external relationships, have you ever tested the product with early adopters? What is your relationship with customers and users?

We have a few thousand users and a few tens of learning centers in schools and for now we are operating only in Israel. Currently we are only a B2B reality so we have relationships with cities and schools, but we would like to move to a B2C business. I think the potential users are mainly set abroad: Israel is a sort of a town for us, it is our starting point because we are here. We just started a process of localization of local partners, we want to polish the product, to stabilize a business operation her in Israel and to get focus groups all around the world for testing. We need to find partners who really like our product and opportunities in different markets. The end of this analysis will help us realize what would be the best solution for us.

Do you have direct competitors?

Honestly, there are two main advantages in our platform: one is the collaborative aspect and the second one is the PBLAI engine. These two together can simply do anything: they empower kids to become creators of digital content and this disrupts the educational market and the gaming one.

How long did it take you to come up with a prototype and an MVP?

Consider we are talking about something very different from the product we have now. It took us about two months to have a super basic MVP. If we focus on the product we have right now, I think it is the third time we are building the product from scratch: we had a team of five developers continuously working on the product for almost a year and a half but the race is long and everything is still developing.

Do you have a plan B? I mean, what is the market suddenly changes its needs?

We are already operating in different directions: we already gained experience in B2B but we are now expanding towards the B2C because we believe it is going to be the engine for our exponential growth, so basically going back to B2B is our plan B because it is something working and that we already tested so something we know and that can keep us alive.

Do you think schools, teachers and kids are aligned with the level of technology you are using and is required to use your product? Startups based on new technologies usually

face problems if we consider parents, for example, while kids are born with technology surrounding them.

We always go inside schools to see how kids deal with technology. They always enjoy it and even if they are approaching something brand new, we give them AI tutorials in order to give them guidelines on how to use every tool. Obviously, there are both hard and easy mechanisms, but we think the use of computers is fundamental for their future because technology is taking over the world as we all know. It is not about knowing how to use coding but programming. We are trying to retrain the problem of teacher knowledge by providing their own online teacher with the AI engine: teacher can help children by clarifying and fixing the questions, making sure they are picking the right answers inside the educational games. These are the kinds of interactions between learners and teachers, so they do not really have to understand how the engineering process are working because self-learning is one of the titles we have. We prefer when kids are interacting with each other.

So, what are you interested in the most? The pedagogical or the technological side?

I think both. We have built the platform with two things in mind: first, there is a pedagogical theory called Mastery Learning, that says that 90% of the class can reach mastery and so the highest grades possible but they just need to repeat, so the teacher should not go on with the new part of the program before children are masters in the current subjects; second, we are a technological company, everything is based on technology and our goal is to make kids use cutting edge technology and its application. With our platform, children can repeat the same stuff but using many different games, avoiding boredom.

What about the resources you have?

We are generating revenues from our clients and now we have started to plan a fundraising program, but we are continuously investing our clients' money. We already

made a small POC[33] and we charge clients even for the POC and we started doing so from the very beginning.

Do you have a business model and a business plan?

No. We have something in mind, but we have goals such as value preposition and selling point because our goal is to build a scalable and replicable business model. In order to reach this, we should build a product which will fit the market needs and this is where we are putting all our energies.

Which are the three main factors affecting the probability of failure specifically for your company and according to your vision?

We are just born and we are small, we could be hit by anything and anytime. I'm looking for value creation for our users and that's it. If you do things properly, people are going to love you and they will keep you alive. But then, there are many competitors that can copy us, I can get sick, our users could wake up one day and stop loving our product.

[33] Proof of Concept, meaning a feasibility proof or feasibility demonstration and so a preliminary example aiming at proving the scope of a specific project. For example, prototypes are forms of POCs.

APPENDIX 7 – COQUA.LABS (YATIR DAVIDOVICH, CO-FOUNDER AND PRODUCT MANAGER)

What is the purpose of your work?

Do you know the term lean startup? We are aiming to lean content: we want to shake your performance and optimize the content. Today there is no tool that helps you realize what happen to your content and how people interact with your content. There are basic tools such as Google Analytics, but nothing allows you to get into the content. Is this specific part of your paper good or not? Is the video specific enough? Me and my partner Adi both want to focus on content, we are obsessed and we think it is usually not good enough. We think that especially big publishers give you colorful news and striking titles, but you may be led to read something that does not give you the exact information you need to find. We want to major this: it took us years to write an algorithm that helps you understand how people interact with the content, so we can know if they have read the entire article, how deep was the content consumption. So, basically, we develop tools to optimize this. Every content's element is analyzed through a score helping to know how good each part was and how each part contributes to the overall perception of the stuff we are considering. Then, you will receive suggestions on how to optimize your article – is it too long? Isn't it better to change the picture? Don't you think is better to add more pictures? Maybe add this media in order to improve the number of accesses to the article or we can produce a podcast instead of a video since people are basically listening but not watching and so on. We are not tracking text in terms of the subject and the overall substance of the article, but we are going to do this too. For now, we are focusing on the structure. In two years from now, if everything will work perfectly, you and I will enter the same article, but we will find completely different stories based on the specific preferences. We want to focus on the behavior of each user.

Do you feel you are part of just the educational world or is there something more?

Of course, there is much more. We used to be part of the educational world but then we have shifted to the content market because of the opportunities and the value of

the whole market in terms of billion of dollars. We are no longer just an EdTech company.

Are you connected to foreign startups and companies?

A year ago, we had a super basic product and it was not good enough to go outside Israel because many parts were missing. With the product we have right now everything becomes much easier. We always talk a lot with other companies when we meet at conferences and stuff like that, but this never materialize into something. I think that in the EdTech market we are completely stand alone because of the differences in the point of view: most of the companies look at the learner while we are focused over the content – we do not care if it is EdTech or not. But in the content market we are following other companies that are breaking this kind of wall publishing related. The thing we are focusing on is very narrow.

Do you think norms and regulations are blocking you?

We are one of the few companies that obtained a grant from the Innovation Authority and we got it because we are considered by them a unique technology and that allowed us to develop the part of the product we already have. We get 50,000 dollars from them and we used the money to develop the MVP we had. In general, I can say the environment here in Israel in very encouraging for startups, it pushes company to move forward. On the other hand, it is not so easy if we consider raising money, it is a different story: I used to have another startup four years ago and I tried to achieve something, but we closed after 8 months because it was a completely different market situation. One reason we are moving from EdTech to content market is that in EdTech usually numbers are even lower when we consider funds.

What about the team?

It is just Adi and I, but we also rely on other external people helping us in many different areas. We have lots of relatives and friends who are getting involved but it is not something permanent, but it comes and goes. Generally, it is always the two of us: a few years ago, we decided to do everything slowly because of personal life – for example, Adi has three kids, she has to take of them and she cannot leave everything and just work. We are enjoying it and we are having fun in doing this: we used to work together

in an insurance company – I was the product manager and she was a project manager specifically for development – and then we realized we no longer liked to work there and we wanted to do something interesting. We are good friends, I know I can rely on her. About the gender differences, I can tell you that Adi is our CTO and she actually feel the difference between men and women in this field, for example when we have to talk with investors because she is a woman and I am not coming from a successful startup experience. On the other hand, the Innovation Authority is helping companies established by women and companies that are made up mainly by girls. We are now involved in a program that allows us to get from 30% to 50% of our expenses back and this was mainly thought for minorities – extreme orthodox, Arabs and women.

How is your relationship with external people?

Once we had the first product, early adopters and testers were super open to try it, but the problem was that the product was not good enough to be implemented back then because we faced too many challenges and we were just too young as a company to deal with everything. Then we changed and started to do something that every content creator would be able to implement and not a developer. We have done tests in Israel before the pivot: pivoting changed everything, so we decided to finish our project before going back to the market. CET knows exactly what we are doing here. I actually think our company will go global: we have already been with users and customers, so they know what they are going to get and what we are going to give them. In many different places people are talking about our project and they want to try it. Listening to users and customers is something basic: they could be very helpful but at the same time they can distract you and make you focus on something that is not so important because they see the world of today, but us as entrepreneurs should focus on the world of tomorrow. The struggle is to bring them to see the world as you see it. We did so many pivots because of this – one was based on technology, another on the market, the third was with users because we try to make them understand is not so easy to meet every need.

What about timing? How long did it take you to create a prototype and then an MVP?

POC was very fast since this is a local environment and everything works perfectly. The first MVP was after six months and here we implemented everything in a website used

to work with, but we did market it enough. Then, we started to work with really complicated technologies and we became really slow because we started to work with Google Cloud platforms and with powerful tools: here the weak part was that for every problem we were stuck in that for weeks, but at the same time we had to work more to bring money home. So, from the stage of the first MVP to the solution we have now, it took us two years. It is a very long cycle and we knew it from the very beginning.

Do you have a plan B?

I guess we already are in plan B. We became such a capable team in a way that I think we would be able to try something else if needed. But, right now, we are focused on what we have because it is a really good product for the market and we strongly believe in it. Three years ago the value of the content market was 200 million dollars – from 40% to 50% is relevant for us – and in 2020/2021 the forecasted value is 400 billion dollars, so it is something huge and we hopefully are in it at the right time.

What about the monetary resources you are using to develop your company?

We received money from the Innovation Authority, but we are also using our own money and family and friends one – we collected 100,000 dollars. According to revenues, it is just too early to talk about that; maybe in six months we could do that.

What do you stress in order to convince investors?

In the very beginning, we didn't have a good story about this because we sound like something that was not going to change the market. We tried to explain how is important the content side but investors didn't believe that people would be open to change content and they didn't see the potential. With the new product we developed, we haven't reached investors yet, on purpose.

Do you have both a business model and a business plan right now?

Let's say, I'm working on it. For the next stage of the Innovation Authority we have to bring them one, so we are working on it even if it is not ready yet. We had one before, but again it was created for a different kind of technological tool.

Thinking just about your company, what are the three main factors that could affect the failure of the company itself?

From a personal perspective, let's say economic status and so a sort of inability to raise money and collect money to live. Second, we collected a crazy amount of data and every process in the internet costs money and we don't know yet is going to cost and this could dramatically affect the company – even if the costs are lowering. And then, the possibility to bring a product to the market that is not good enough: this is more than just being able to meet the needs and the expectations of people. We should bring something that is outstanding and focus over the experience we bring to people.

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