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Public-Private Partnerships (PPP) in Technical Education: The Case of Egypt's Applied Technology Schools (ATS)

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List of Abbreviations

ATS	Applied Technology Schools
CAPMAS	Central Agency for Public Mobilization and Statistics
DS	Dual System
EDF	Education Development Fund
EFIA	Egyptian Federation of Investors Associations
ePPPs	Public-Private Partnerships in Education
ETQAAN	Egyptian Technical Quality Assurance and Accreditation National Authority
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IBM	The International Business Machines Corporation
IFC	International Finance Corporation
ITEC	Integrated Technical Education Clusters
MENA	Middle East and North Africa
MoETE	Ministry of Education and Technical Education
MoHE	Ministry of Higher Education
NAQAAE	National Authority for Quality Assurance and Accreditation of Education
NASS	National Academy for Science & Skills
NCTDE	National Center for Technological Dual System
NGOs	Non-Governmental Organizations
PFI	Public Finance Initiative
PPP	Public-Private Partnership
PVTD	Productivity & Vocational Training Department
QA	Quality Assurance
QDB	Qualification Development Bank
RUDS	Regional Units for Dual System
TSS	Technical Secondary Schools
TVE	Technical and Vocational Education
TVET	Technical and Vocational Education and Training
UN	United Nations
UNESCO	The United Nations Educational, Scientific and Cultural Organization
WB	World Bank

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Abstract

Technical education is a form of education that gained momentum in the 1800s and was considered as a parallel distinct model to general education by the post-war period. Public-private partnerships (PPPs) were one of the scaling up and enhancement efforts of technical education. In Egypt, the technical secondary education system has various school models; however, it was until 2018, when we first see the implementation of an PPP model with the establishment of the Applied Technology Schools (ATS). ATS schools aim at supplying the labor market with experienced skillful competent graduates in the demanded sectors in the Egyptian labor market, and according to international standards. The system started with three pilot schools in the academic year 18/19 and currently it has over forty schools. Within this context, the PPP model adopted in the ATS system remained unstudied, and accordingly the challenges and opportunities to the model was unexplored. Through conducted interviews, the study explains how the ATS schools started in Egypt, its main stakeholders as well as the internal structure inside the ATS school. The study also maps how the PPP model is governed and coordinate in the ATS system. Given this mapping, the study then identifies the PPP model implemented as an *operational* and *educational* PPP, explaining the *scope, scale, method, and motive* of this PPP. Lastly, the study also pinpoints key challenges and opportunities for the currently implemented model of PPP, recommending potential ways of enhancement, which would be useful given the vision of expanding the model in the country to reach 420 by 2030.

1 Introduction

1.1 Technical Education and Public-Private Partnerships

Technical education as a form of education gained momentum in the 1800s across different parts of the world. In the US, it can be traced back to the opening of St. Louis Manual Training School in 1879, which aimed at educating students with both "books and actual things" (Woodward, 1887, p. 169). The school focused on teaching students' woodworking and metalworking skills. In England, in 1847, the Society of Arts encouraged opening "industrial classes", where the Government School of Mines and Science were established in the 1850s, followed by other schools in the same time interval (Armytage, 1957, p. 64). In Australia, in Queensland, technical schools started as an alternative to expensive grammar schools that was only available to the wealthy. It started in 1872 with Charles Lilley establishing classes for teaching "young mechanics and tradesmen the elements of the useful arts and science" with the vision that this would lead to "greater industrial efficiency and productivity", and further these young men's careers (Department of Education, n.d., p. 1). These classes failed to continue but the idea of technical schools reappeared again in 1881 with classes teaching mechanical art and freehand drawing (ibid). Technical schools/classes were established in other parts of the world starting the 1800s such as India and Hong Kong.

Moreover, the role of international organizations in pushing to spread technical and vocational education started in the 1950s, where technical education was seen as "the key means for preparing citizens for modern society in a Cold War context" (Granata, 2022, p. 101). It is not until the post-war period that we notice the progress split between general education and technical education into "two distinct areas" – general education leading to further studies and attended by the privileged higher socioeconomic groups, and 'vocational' or 'technical' education that at that time "was an increasingly widening and multi-faceted emergent area" attended by those seeking knowledge and skills that would prepare them to enter quickly the labor market (ibid, p. 102).

Eventually, in 1989, the General Conference of UNESCO adopted the Convention on Technical and Vocational Education (TVE), recognizing that "the pace of technological, social and economic development has considerably increased the need to expand and improve the technical and vocational education provided for both young people and adults" (UNESCO, 1989, p. 1). According to Article 1 of the Convention on TVE, technical and vocational education refers to:

> "All forms and levels of education process involving, in addition to general knowledge, the study of technologies and related sciences and the acquisition of practical skills, know-how, attitudes and understanding relating to occupations in the various sectors of economic and social life" (UNESCO, 1989, p. 2).

Three years later, UNESCO launched the UNEVOC to support member states to improve their TVET systems with the slogan of 'Quality TVET for all' (UNESCO-UNEVOC, n.d.). The Convention and the establishment of UNEVOC demonstrates the global recognition of the importance of technical education in fostering youth employment through "equipping youth with the skills required to access the world of work" (UNESCO, 2016, p. 7).

Over the years, the field of technical education has undergone various developments as the search for the best model continues. Similarly, to meet the objective of technical education in enhancing youth employment, national governments have aimed at scaling up TVET programs, responding as well to labor market needs. Close collaboration with the private sector on macro- and micro-levels through Public-Private Partnership (PPP) agreements was one of the scaling-up efforts (LuxDev, 2019). PPP is argued to lead to improved labor market-oriented programs, and more effective and relevant trainings, and increasing alignment of skills with the economy's needs (ibid). In addition, PPPs were seen as "an opportunity to correct inefficiencies in the public delivery of education" (Verger, 2011, p. 109). In low-income contexts, PPP was also seen as an opportunity to mobilize resources to increase effectiveness and access to education (ibid).

Although there is no one definition of a PPP, according to the World Bank (2017), the term indicates a wide range of long-term agreements between the private sector and government entity/entities for providing a public service or asset (p. 1). PPPs are a mechanism for the

government to procure and implement public infrastructure and/or services using the resources and expertise of the private sector (LuxDev, 2019). While PPPs have existed since the start of the organized government, the private component of government has started to become stronger in the 1700s and 1800s. It flourished again in the mid-2000s with the evolution of the governance systems and the need to establish new roles for the governments to share power and influence with market actors and civil society (Wettenhall, 2010, p. 17).

From 2001-07, PPPs have been of great macroeconomic importance, where it constituted, for instance, 57.1% of project expenditure in the UK (IFSL Research, 2008 as cited in Hodge & Greve, 2007), which is the "intellectual leader" in PPP in terms of professional experience and capability (Hodge & Greve, 2007, p 7). In 2015, PPPs were promoted in the UN Conference on Financing for Development as "means of implementation" of the 2030 Agenda for SDGs. PPPs are gaining an increasing importance (UN, 2015). Pointing out to the importance that PPPs currently play, Reamer (2015) states that, "Public-private partnerships have the ability to scale and surge at the pace of U.S. innovation, enabling new value-added services and unimaginable integration into the daily lives of the public" (p. 18).

PPPs have flourished in contexts where governments are facing aging or lack of infrastructure and require more efficient services. In such cases, a partnership with the private sector can help foster new solutions and bring finance (LuxDev, 2019). The educational sector is one of the areas, where PPP started to gain momentum. Declining national public funding for education has encouraged this practice in the educational sector, where the private sector is seen as bridging gaps beyond the state's scope. PPPs are not an objective in themselves but are argued to be a tool to reach the objective of strengthening TVET (LuxDev, 2019).

1.2 Egyptian TVET System and ATS

Looking at the percentage of enrollment in technical secondary education worldwide from 1985 to 2013 shows that the rate is almost stable, where it remained between the range of 20-25% of students globally. Interestingly, throughout the years, almost half of this percentage is found within the MENA region. In 2013, for instance, nearly 11% out of the 22% of the students enrolled in technical secondary education worldwide were from the MENA (UNESCO Education Statistics as cited in Elish & ElShamy, 2016).

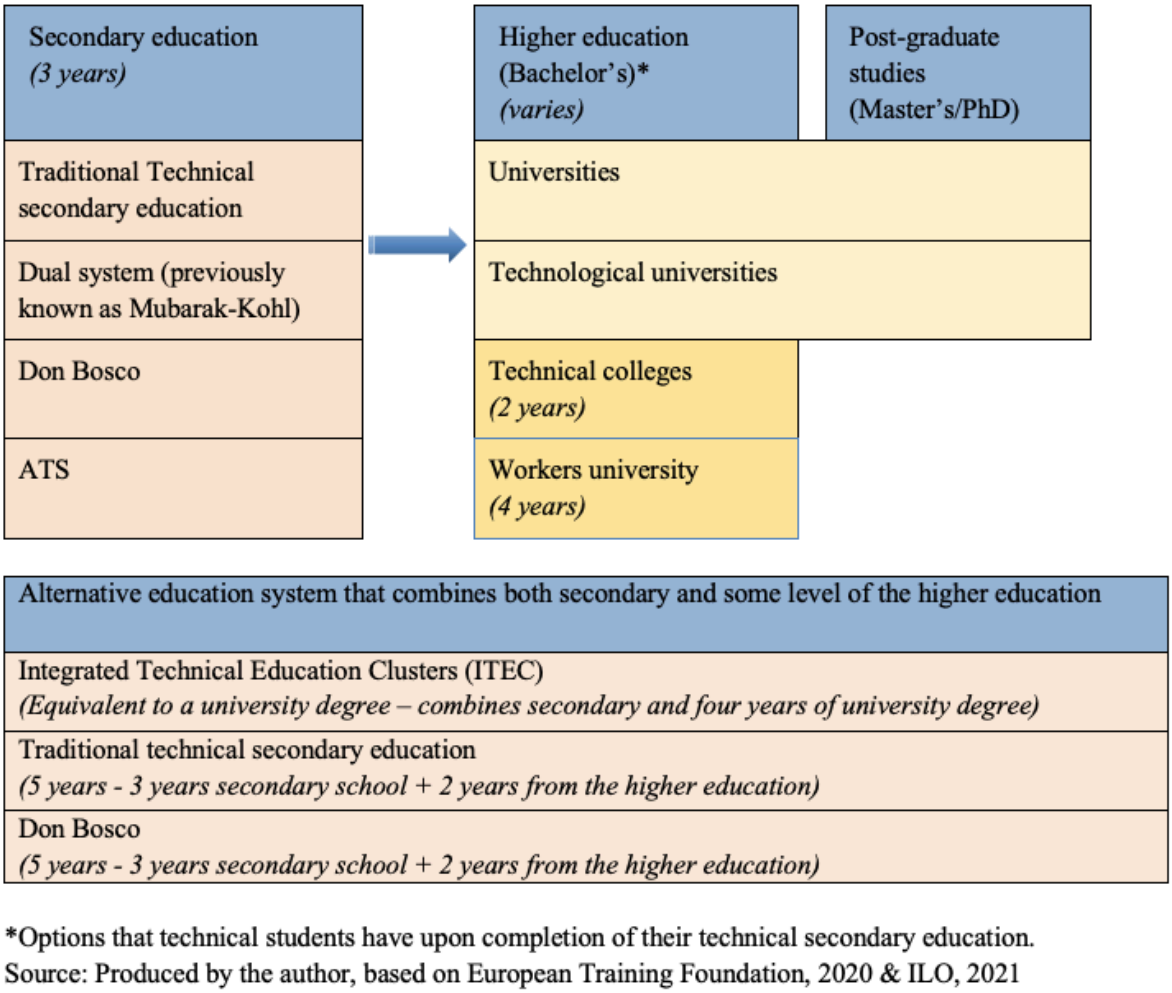
Notably, within the MENA region, Egypt has the highest enrollment percentage. During the same year (2013), Egypt had a 22% enrollment rate in technical secondary education of the total secondary education within the MENA region (UNESCO Education Statistics as cited in Elish & ElShamy, 2016). This high percentage sustains over several years, where according to the ILO (2021)- "the Egyptian TVET system is one of the largest in the MENA region, with more than 2,900 different institutions serving around 2 million students in 2018" (p. 20). As Heynemann (1997) further affirms, Egypt has one of the "most technically oriented" secondary school systems in the world, with a high percentage of enrollment in technical schools.

Technical education is usually referred to as "TVET" – Technical and Vocational Education and Training. However, it is important to note that this terminology includes more than the formal technical education provided as it includes vocational trainings and technical workshops offered to different segments of the society including technicians who want to improve their skills. In Egypt, different ministries provide formal and informal technical services. Ministries such as the Ministry of Trade and Industry, and the Ministry of Health provide formal technical services such as nursing trainings. Table 1 in appendix 1 lists the governmental authority/ministry and the technical and/or vocational program each provides. In addition to these programs, the private sector and non-governmental entities offer some TVET programs, listed in Table 2 in appendix 1 in the appendix. Programs provided them offer specific specializations, and thus, they do not cover all specialties.

At the pre-university level, however, the Ministry of Education and Technical Education (MoETE) is the main provider of formal technical secondary education service (MoETE, 2020).

Technical secondary education is a formal alternative track to general secondary education. Figure 1 illustrates the different technical education tracks. As evident in Figure 1, there are different technical secondary school systems that students can choose from when selecting technical education.

Figure 1. Egypt's Technical Education System: An Overview



*Options that technical students have upon completion of their technical secondary education.
Source: Produced by the author, based on European Training Foundation, 2020 & ILO, 2021

The first school system is the traditional technical secondary schools. These are provided and administered by the MoETE and "constitute the largest capacity for TVET provision in Egypt when compared with all other TVET providers" reaching 2,288 schools in 2020 (ILO, 2021, p. 21). While there are many sub-specializations within traditional technical secondary education, the main ones are as follows: Industrial, Agricultural, Commercial, and Hospitality.

The second and third school systems, DS and Don Bosco, are based on the German technical secondary school model, and the Italian model respectively. Don Bosco, however, is older than the DS. It was established in Egypt in the mid-1800s by St. John Bosco, an Italian saint–educator (Don Bosco, 2023). While the first two schools are considered governmental, Don Bosco is considered non-governmental (ILO, 2021) as it is managed by the Don Bosco (founded in Egypt in 1926 and is part of the international network of Don Bosco Institutions) representing the Italian Ministry of Education (Don Bosco, 2023; ILO, 2021). On the other hand, DS was established in the 1990s based on a bilateral German-Egyptian agreement, and was launched in 1994 (Antoninis, 2001). The German Organization for Technical Cooperation (GTZ) was the main donor organization responsible for the funding of the DS schools (Antoninis, 2001, p. 20). Since 1992, on behalf of the German government, GIZ Egypt (previously GTZ) has been technically supporting the implementation of the DS in Egypt (ILO, 2023).

Both the DS and Don Bosco constitutes a small percentage of technical secondary schools (ILO, 2021). Don Bosco has only two schools in Egypt. One in Cairo and one in Alexandria (Don Bosco, 2023). The DS is implemented in 24 governorates with 21 schools in addition to 198 DS classes that are taught at the premises of traditional technical secondary schools (European Training Foundation, 2020). In 2022, the DS students constituted 3% of the overall number of students enrolled in technical secondary education in Egypt – 65,000 students out of 2.2 million (European Training Foundation, 2022).

DS is offered only as a 3-year program. However, traditional technical secondary schools and the Don Bosco are offered as 3-year program or a 5-year program. The 3-year program offers a technical diploma for technicians, and the 5-year program offers an advanced technical diploma for senior technicians (European Training Foundation, 2020, p. 7). The 5-year programs add additional two years from the higher education to the three-years of secondary education and thus, it combines some level from the higher education (ibid).

Similarly, the Integrated Technical Education Clusters (ITEC) offer the students a 3-year program, a 5-year program, and a 7-year program. The 3-year program leads to a diploma

equivalent to the traditional technical secondary certificate. The 5-year program provides the graduate with an advanced Diploma of Technology, and the 7-year program offers its graduate a Bachelor of Technology degree (ibid). The model was introduced in 2009/2010 by the Education Development Fund (EDF)[1] and is based on partnerships with international sectoral specialized educational partners, and thus, provides technical education that complies with international qualification frameworks (ILO, 2021). As of 2021, there are only four ITEC schools in Egypt: Amireya ITEC, Cairo; Fayoum ITEC; Assiut ITEC; and Abu Ghaleb ITEC, Giza (ibid).

In addition to all these operating schools, there is the Applied Technology Schools (ATS). ATS schools are the only technical secondary school system that is based on the PPP model. In September 2018, the government, represented by the Ministry of Education and Technical Education (MoETE), partnered with local public or private sector companies, such as El-Sewedy Foundation for development, El-Araby, IBM, and Talaat Moustafa Group, among others, to provide and co-manage this new secondary technical educational system – known as the Applied Technology Schools (ATS). ATS came as part of the MoETE's reform plan (transformation of Technical Education 2.0) (ILO, 2021, p. 23). According to the MoETE, ATS is considered "a new system of technical education" that is based on a partnership between the government, private sector, and a quality assurance institution (MoETE, 2020). The aim of this partnership is ensuring supplying the labor market with skillful competent graduates for the demanded industrial sectors (ibid).

The initiative started in 2018 by three ATS schools, eight more were established in 2019, five were established in 2020, with the aim of reaching at least 100 ATS schools by 2030 (ibid). With the success of the model, the target changed into reaching 420 schools by 2023 (MoETE, 2023). Currently, there are over forty schools, and they are expanding. Appendix 2 provides the full list of school names, location, majors, and the main private sector partner as of 2023. Cairo has the most ATS schools, followed by Giza and El-Sharqia governorates. Some governorates have only one ATS school such as Menofia, and Al-Qalyubia. The latest official statistics found about the number and percentage of students enrolled in ATS compared to the other technical secondary

[1] The EDF was established in 2004 by a presidential decree no. 290 of 2004. The fund acts as an autonomous agency and is tasked with reforming the education system. It is chaired by the Prime Minister and includes the MoETE, MoHE – among others (EDF, n.d.). This model was introduced by the EDF among other models (ILO, 2021, p. 26).

school systems shows that the ATS has 63,000 students in the academic year 2019/2020 (MoETE, 2020). This is out of a total of 2.05 million students enrolled that year in technical secondary education, and thus, ATS students constituted 3% of the overall technical education students (ibid). This percentage is expected to increase with the current establishment of new schools, and the MoETE's goal of achieving 420 schools by 2030 (MoETE, 2023). In 2023 only, over eleven new ATS schools were launched (KalamSaleem, 2023).

ATS schools are a 3-year or 5-year technical secondary education[2], which aims at improving and advancing the technical system in Egypt and ensuring that graduates are qualified to work in local and international markets (MoETE, n.d.). The qualification to work in international markets comes from one of the three certificates that the graduate receives, which is an internationally accredited certificate. This certificate is issued by an international accreditation body that varies depending on the discipline. For instance, automotive, electrical systems, air conditioning majors are accredited by City & Guilds, a global leader in vocational accreditation (NASS Academy, n.d.a). Mechatronics major is accredited by Siemens Technologies, where their mechatronic systems certification program "is one of the most esteemed mechatronics certification programs in the world" (ibid).

It is also expected that upon graduation, the industrial partner would hire the graduates in the company whenever needed and based on the student's major (MoETE, n.d.). This acts as an important solution for the high unemployment rates in Egypt, where, as Helmy (2017) points out, creating more jobs in the Egyptian market is not enough to solve the unemployment problem as employers indicate the challenge of finding the right qualified skillful candidates for their open vacancies. However, this governing of this system and the efficacy of a PPP has remained understudied in education research on Egypt thus far.

1.3 Problem Statement, Research Objectives and Research Question

The research problem at hand is the limited exploration and study of PPPs in the educational sector in Egypt, especially the ATS model since their emergence in 2018. As a relatively new

[2] Duration varies from one school to another.

phenomenon in the Egyptian context, the ATS ecosystem and the role each stakeholder plays in the PPP are yet to be understood by the researchers and even within education policy networks. At the same time, due to the relative difficulty in accessing these private spaces, the challenges and opportunities associated with PPPs in Education have remained largely unexplored.

Ginsburg (2012) warns from treating the conceptualization of PPP in education as homogeneous, pointing out to the significant need of looking at each context, its partners, motives of participating in PPP, and the roles each partner play in the PPP. The study adds that the "general exhortations" in the literature for and against PPPs are not appropriate to celebrate or criticize PPPs (p. 75). The question of whether to encourage PPPs in education is dependable on the context. Clerck et al. (2012) affirms that PPPs must be assessed in their local context to be able to understand its advantages and disadvantages. Agreeing with that, Gudrid (2005) adds that "It is very common to find general statements about the pros and cons of public-private partnerships in the literature. Such statements must logically be false since conclusions about the functioning of PPP cannot be lifted to a general level" (p. 3).

In addition to that, there is a need for empirical evidence on the complex relationships between the private and public sector in education. Latham (2009) points to the "lack of robust empirical evidence … evidence that could … illustrate the diverse channels of relationship …in the private provision of public services … and shed light on concerns associated with PPPs" (p. 159). This is also mentioned by Nundy et al. (2021) as they mention "there are very few studies that have focused on the power dynamics between the actors" in PPPs (p. 8).

Therefore, the aim of this research is to map and examine these partnerships comprehensively to gain a deeper understanding of their potential benefits and drawbacks. By addressing this research gap, we can enhance our knowledge of PPPs in Egypt and provide valuable insights for policymakers, stakeholders, and practitioners involved in shaping and implementing these emerging collaborations.

Accordingly, the main research question that this study aims to answer is as follows:

How is the PPP model governed, coordinate, and implemented in Egypt's ATS system? and what are its key challenges and opportunities?

Some of the investigative sub-questions guiding this study include:

1. How are the public and private roles defined in the model?
2. How is the PPP governed in the ATS model?
3. What are the main policy and operational challenges and opportunities for this model?

1.4 Policy relevance

This study is relevant to the current prioritization of the Egyptian government to enhance the technical secondary education so that it is able to better provide the needed knowledge and skills to its graduates. The Egyptian government acknowledges the importance of the technical education, where it is seen as the way to have "appropriately skilled labor", which is needed to achieve "real economic development" (Abdel-Hafez, 2020).

With the inauguration of President El-Sisi, Egypt has emphasized its interest in enhancing the technical secondary school systems with a commitment to "encouraging and developing technical education and professional training …"– according to the Egyptian 2014 constitution (Egypt's Constitution of 2014, p. 15). This commitment was also reflected in Egypt's Strategic Vision 2030, where a separate section was dedicated to technical education along with its own objectives and KPIs (Egypt Vision 2030, p. 28).

The government's commitment towards the enhancement of the vocational and technical education sector is also manifested in the reform efforts made to reach "a unified agreed vision for VET" among the various stakeholders. Such efforts have resulted in drafting a number of strategic documents that tackle challenges to the VET reform (ETF, 2020, p. 13). One of the drafted documents that have already been adopted in 2018 and launched in 2019 is the Ministry of Education and Technical Education's "Technical Education 2.0" for the "Transformation of Technical Education". The launch of the program included a number of educational reforms with the main focus on offering competency-based curricula, aiming at improving the quality and

relevance of technical education (European Training Foundation, 2022). The strategy aims at reforming technical education to change the economy into a market-drive one (ILO, 2017). The strategy also aims at establishing new models of PPPs (European Training Foundation, 2021). Technical Education 2.0 strategy relies on five main pillars of reform (MoETE, 2020), as follows:

- *T1 – Transformed Quality of Technical Education CEQAT + ETQAAN*[3]
- *T2 – Transformed Relevance of Technical Education Programs by Transferring to Competency-based Curricula (CBC) competences*
- *T3 – Transformed Teachers through Training and Qualification TVETA*
- *T4 – Transformed Schools through Employer Engagement and Work-based Learning (WBL) + Applied Technology Schools + Dual System*
- *T5 – Transformed Image of Technical Education through changing Social Perception*

This new strategy is described by the UNESCO-UNEVOC International Centre (n.d.) as "an innovative program that will be the spearhead of the transformation of the Egyptian Technical and vocational Education and training system". The European Training Foundation (2022) analyzes these changes and notes "since the launch of Egypt's Sustainable Development Strategy – Vision 2030, the education sector, and TVET, has been in the spotlight. There is a renewed interest for TVET of the highest levels of the policy arena" (p. 6).

ATS schools started with three schools in the academic year 2018/19[4] (UNESCO, 2019, p. 28); however, with the noticed success of the model, in 2020 this expanded into eleven schools (Enterprise, 2023), and now there are over forty schools, and they are expanding. More importantly, with this success, the MoETE's initial plan in 2019 changed from establishing 100 ATS schools by 2030 (UNESCO, 2019, p. 28) at a pace of 10 schools per year (Enterprise, 2023) into reaching 420 schools, according to the presidential mandate (MoETE, 2023). According to

[3] In September 2020, the Egyptian Cabinet established a TVET QA authority (ETQAAN).
[4] The first three ATS schools is Al-Araby in Quesna, Metwaly Shaarawy in New Cairo in partnership with Talaat Moustafa, and Badr in Badr City in partnership with Elmaco and Egytrafco who partnered with the government as a consortium.

the Ministry spokesperson Shady Zalata, there is no set timeline yet for this new plan; however, it is a top priority (Enterprise, 2023).

In May 2023, the MoETE participated in the founding meeting for the Global Partnership for Education, which is an international platform that aims to help governments in developing countries enhance their education systems. The Ministry expressed during the meeting that "technical education has an important role in influencing the country's economy … and the ministry's strategy aims to shift towards technical education that meets the needs of the labor market" (MoETE, 2023). More importantly, the Ministry mentioned ATS schools in particular as "an important model that embodies the success of that system in cooperation with business institutions and private sector as an active participant in the management and operation of these schools" (ibid).

Within this momentum about the ATS schools, this study serves as an important document for two reasons. Firstly, it maps out the ATS ecosystem, its main stakeholders, their roles, and the operational relationship dynamics between them. With this mapping, the study provides the first wholistic understanding of the ATS system since its launch in 2018 and analyses its challenges and opportunities pave the way for its further development based on stakeholders' perspectives. This type of grounded data would thus help policymakers and decisionmakers in planning the future of the ATS system, mitigating these challenges, and capitalizing on the opportunities.

1.5 Outline of the thesis

The thesis is divided into seven chapter. This introductory chapter discussed the global and local histories of TVET education and the role of PPPs in their implementation. The second chapter includes the literature review about PPPs detailing the debates within education policy and the recent rise of literature on the Egyptian case. Chapter three provides the contextual policy background about technical secondary education in Egypt. The fourth chapter explains the conceptual framework of this research, drawing on a review of the main typologies of Education PPPs in the literature. This is followed by chapter five explaining the research design and methods used in study. Chapter six discusses the main research findings, mapping the PPP type implemented in the ATS school, and analyzing stakeholder perspectives on its challenges and

opportunities. While Chapter seven concludes the study and provides policy recommendations based on the interviewed stakeholders' perspectives.

2 Literature Review

The literature review chapter is divided into three main sections to cover the literature written on this study's two main variables: PPPs and technical education. The first section examines the concept of PPPs, its origins, and its various definitions. The second section reviews global scholarship on education PPPs (ePPPs). This includes the development of the concept of PPPs in education, literature examining its implementation in different contexts, and literature on PPPs in technical education in particular. The third section then examines the literature written on technical education in Egypt as it is the study's case study. Within this section, I examine also the literature produced on the ATS schools as well as the PPPs in technical education in Egypt.

2.1 Literature on PPPs

While PPPs have been widely used, the historical origins of the concepts vary from one country to another. However, generally, it can be said that the concept can be traced to the 1970s and 1980s. PPP has been used as an acronym since the 1970s (Bovaird, 2010). It emerged as a terminology in modern governance in the US during this time (Wettenhall, 2010). While the private component of the US government grew stronger in the 1700s and 1800s, PPPs developed in two global agendas in the 1980s and 1990s. One that is related to infrastructure projects (mainly in the UK during Blair's time), and the other extends more broadly to "a wide range of mixing agreements" that are beyond infrastructure projects to include a concession model that was commonly used in France since the 19th century (Wettenhall, 2010, p. 26). This concession model entails that public authorities keep the ownership of the facility and grant leases/concessions for the private sector to finance operations and maintenance while retaining profits from the resulting revenues (ibid).

During Carter's administration (1977-1981), PPPs gained popularity, with the enlisting of the private sector's financial contribution in urban redevelopment projects (Linder & Rosenau, 2000). During this time, PPPs were also gaining momentum in Britain, as Harding (1998) traces the origins of the concept to the conservative government of 1979, where one of its key themes was increasing the private sector role in the provision of goods and services. In the 1990s, the

terminology was used as a "buzzword" with the noticeable importance of England's Public Finance Initiative (PFI) experience (Bovaird, 2010).

Nevertheless, in other countries, the origin of the concept differs. For instance, Hearne (2009) explores the origins of the PPPs in delivering public services and infrastructure in Ireland, tracing it back to a pilot project in 1999 (p. 3). The origins also differ based on the sector within the same country. For instance, in India, PPPs can be traced to the early 1990s with the private investments in the national highways (Ramakrishnan & Raghuram, 2012, p. 3). On the other hand, however, PPPs in the health sector in India dates to 2005 with a pilot project that took place in rural areas (Thadani, 2014, p. 312).

Similar to this variation in the historical origin of the concept, there is also variation in the definition of PPPs in the literature. For instance, Van Ham & Koppenjan (2001) defines PPP as institutional marriages. Like marriage planning, PPPs need planning in the tendering phase as well as risk management (ibid). Osborne (2001) and Grimsey & Lewis (2004) focus on the risk management dimension, arguing that PPPs are contractual agreements that link institutions together in a way that legally allows for the sharing of risks and returns.

Schneider (2000) expands the definition to include that all forms of private involvement in the public service provision, including privatization and contracting out. Kitsos (2015) agrees with this definition, considering privatization as a form of PPPs. In fact, he argues that "the promotion of privatization doctrine through the recourse to PPPs as a low-intensity privatization method can sometimes realize the attraction of the private sector to invest in areas" (p. 17).

Some other definitions prioritize the scope of partnership when defining PPPs. For instance, Tvarno (2005) and the National Agency for Enterprise and Construction (2005 as cited in Gudrid, 2005) consider projects that have the private contracts either finances and/or operates them as PPPs. Projects where the public sector finances the project and maintains it while the private sector designs and builds a project is considered typical modes of cooperation and not PPP. Savas (2000) on the other hand looks at this same scope of financing and operation and includes this form of cooperation as part of PPPs.

While these definitions look at the partnership itself and its form, some scholars look at other external factors when defining PPPs. Linder (1999), for instance, draws our attention to the ideological usage of the term, which might imply different meanings of the concept. He critically analyzes the strategic usage of PPP by political players within the two political ideologies of neoliberalism and neoconservatism, pointing out six "distinct uses of the term" that are linked to their respective meanings in these two ideologies. Linder (1999) draws the attention to PPP as a political and a policy "symbol" (p. 35).

Generally, this variation in defining PPPs can be explained by the fact that the literature on PPPs covers a wide range of research areas depending on the discipline. Hodge (2010) mentions this multidisciplinary nature of the PPPs as a challenge in defining PPPs. Clerck et al. (2012) illustrates this further by giving the example of economists and engineers, where the former would be concerned with the "social marginal cost", and the latter would be looking at the feasibility studies of the PPPs (p. 248).

Gudrid (2005) have also reached a very similar explanation to why there is difference in defining PPPs. He relies on the same idea of the multidisciplinary nature of PPPs to categorize the literature on the definition of PPPs into five distinct approaches, as listed in Table 1.

Table 1. PPP Approaches in the literature

	Local Regeneration Approach	Policy Approach	Infrastructure Approach	Governance Approach	Development Approach
Focus	Developme nt of local economies, weak local economies	Delineating and evaluating the public-private divide in policy sectors, the respective rolesof the public and private sectors	Infrastructure projects; predominately from a financial or legal perspective	New ways of delivering public services	How to enhance development inless developed countries via public-private collaboration
Central issues	Economic development, issues of democratic legitimacy	The optimal public-private constellation in different policy sectors	Contract negotiations and financial aspects, ideological debates, democratic legitimacy	Organizational and management issues, conditions for cooperation, the movement from government to governance	Development objectives suchas sustainable infrastructure and alleviatingpoverty
Origin	US urban governance literature	Primarily US policy literature	UK Government, Private Finance Initiative (1992)	UK Government PPP policy post-1997. The movementfrom government to governance	Mixed genesis

Source: Adopted by the author from Gudrid, 2005, pp.16-17

The first approach is what he calls “the local regeneration approach”, where the definition focuses on local partnerships between governments and businesses to enhance local development (p. 5). The second approach is the “policy approach”, which originates from the American public policy literature that focuses on analyzing PPPs within a certain policy area, and thus, it does not include any specific form of PPP (p. 6). The third approach is the “infrastructure approach”, where scholars focus on PPPs in relation to the financial arrangements (ibid).

The fourth approach is the “development approach” taken by national and international governmental and non-governmental actors including international NGOs such as the WB and the UN. While each entity in this approach has its own PPP programs, they all focus on producing knowledge to guide the implementation of PPPs, shading light on combating corruption and challenges of poverty (Gudrid, 2005). Lastly, the fifth approach is the “governance approach”. Within this approach, PPPs cover a wide range of agreements between

the private and public sector. This approach does not analyze PPPs in context-specific setting, or a policy-specific sector. Instead, it looks at all levels of governance in various policy sectors, focusing predominantly on the organizational and management aspects of PPPs (Gudrid, 2005).

While these approaches presented by Gudrid (2005) explains the reason behind the different definitions of PPPs in the literature, it also confirms the variation in the literature in tracing the origin of the concept of PPPs, as previously mentioned as evident in the table.

2.2 Global Scholarship on Education PPPs (ePPPs)

2.2.1 PPPs in education

2.2.1.1 Development of the concept of PPPs in education

PPPs in education on the other hand is not as old as the concept of PPPs itself. The first published usage of the term "PPPs for education" is by the World Bank and the Asian Development Bank report in 2000, titled 'the new social policy agenda in Asia' (Marshall & Bauer, 2000). Since then, several publications started examining the model, and the literature on Public-Private-Partnerships in education has been increasing over the recent years concurrent with the PPP expansion in education globally as PPP is becoming a "global education policy" (Steiner-Khamsi & Draxler, 2018, p. 5).

Robertson & Verger (2012) look at the global historical developments of the concept of PPP relating it to the neoliberal ideas in the 1980s and the development of the role of the state. The study also looks at the ways in which global policy actors played a role in "reshaping the development domain" (p. 36). In this aspect, the study mentions the core documents that contributed to setting PPP in education on the global agenda, which are produced by the WB and the International Finance Corporation (IFC) (LaRocque et al., 2001). The WB publications argue for PPPs in education as cost-effective policy solutions that would lead to increased access and quality, which are pressing issues facing many education systems, particularly in developing

countries (LaRocque, 2008; Patrinos et al., 2009). Publications by the International Finance Corporation (IFC) provide similar arguments.

In fact, these knowledge production products by the WB and IFC has played a significant role in the development of the concept and its adoption in different contexts globally. Verger (2011) views the development of PPP in education as a "programmatic idea" and argues that there have been strategies by which it was promoted in the education agenda globally by a group of "policy entrepreneurs", especially in low-income developing countries. Mundy & Menashy (2012) also examines the role of IFC in promoting PPP in education., given the expansion of IFC at that time. They argue that despite the weak collaboration between the IFC and the WB, they share similar views on the advantages of PPP in education and have promoted its adoption in different countries.

2.2.1.2 Education PPPs in Context

PPPs have increasingly been considered as an innovative policy approach to provide education (Verger & Moschetti, 2017). Private sector involvement in the management of technical trainings is argued to increase the alignment of skills with the economy's needs (LuxDev, 2019). Theoretically, this partnership would also lead to improved labor market-oriented programs, and more effective and relevant trainings (ibid). Governments also consider it as an efficient, flexible, and effective way of expanding their education systems (Robertson et al., 2012).

Scholars have also looked at the application of ePPPs in different settings, examining the different forms of ePPP implementation. Within this examination, the main debate in this literature is whether PPPs should be commended and encouraged in education, or it negatively impacts issues such as accessibility and equality, and thus, it should not be encouraged.

For instance, Steiner-Khamsi & Draxler (2018)'s book, titled "the state, business and education: public-private partnerships revisited" examines the increasingly successful businesses, philanthropies, and non-profit entities' capture of public funds to provide private schooling. It looks at the public subsidization of private education as a form of PPP, analyzing how this form of PPP affects issues such as quality, equality, and human rights in different countries including Brazil, China, Bangladesh, and USA. The study shows that in this form, private actors increased

their involvement in education as a business, which in some contexts did not ensure equality and/or quality.

Harma (2009) looks at another form of PPP, where the private sector provides “low-fee” education, compared to the private schools, in India. The aim of this initiative is increasing the accessibility of education to the poor. However, the author notes that these schools were still unaffordable for over half of her sample of children and thus, she argues for public schooling.

While Harma (2009) looked at the accessibility issue with this form of PPP, Patrinos & Sosale (2007) examines the educational return on different forms of PPPs implemented in Brazil, Colombia, the US, and England. They point to the impact of PPPs on student achievement, barriers, and achievements of PPPs in education in these contexts. Being a WB publication, Patrinos & Sosale (2007) argues for the adoption of ePPPs, arguing that “PPPs play an important role in enhancing the supply and the quality of human capital” (p. vii).

In the same vein, Ball (2007) examines the privatization of public education as a form of PPP, how it takes place, its legitimacy, value, some ethical considerations, and its implications. However, unlike Harma (2009), and agreeing with Patrinos & Sosale (2007), Ball (2007) argues for the role of the private sector, pointing out that there is “no going back” to the time when the public sector solely managed the education system.

Agreeing with Ball (2007), Claypool & McLaughlin (2015)’s book looks at the usage by public schools of private education in the US as a form of PPP, assessing its variation across States, and whether it meets the needs of the “most challenged” students including students with autism. The book concludes with recommending the “greater utilization of PPPs”, as PPPs provide “focused solutions” and is able to address complex long-term issues such as dropout rate and provide solutions for children with autism.

On the other hand, Fleet (2012) disagrees with the proposition that the PPP does yield positive results. The study points out to the disconnect between the motivations of the American corporate philanthropy and the education needs of the most marginalized in the community. The

study shows that relying on corporate philanthropy as "key component in supporting education in developing countries is not a complete solution" to advance education goals, especially in the most marginalized communities. Between both sides of Fleet (2012) and Ball (2007), Woessmann (2006) analyses the correlation between financing and operating the schools through the PPP model, indicating the effectiveness of public financing with private operation, which is related to better student performance.

Similar to Fleet (2012), Bhanji (2012) studies the corporate-led PPPs in education with a case study on Microsoft. One of his study's findings is very relevant to this research, as he notes that most of PPPs in education, if not sub-contracting of services or privatization, are in the field of technologies. The case study on Microsoft illustrates that private companies have the interest and the expertise to help ensure there is a technology-savvy generation. One can see this is true in the case of the ATS in Egypt.

Looking also at private corporations in PPPs in education, Chattopadhay & Nogueira (2013) examines the case in Brazil in two secondary schools, where the State of Rio de Janeiro partnered with two Brazilian private corporations in a PPP agreement. Confirming Bhanji (2012)'s point, these schools are technological. Chattopadhay & Nogueira (2013) argue that the model implemented in Brazil, which is a "co-management" PPP in education, is a promising model as it addresses the challenges of secondary education in the country.

Other studies examine the problems that PPP in education faces in implementation. For instance, Issayeva et al. (2018) study the problems facing the PPP in education in Kazakhstan, recommending local regulatory reforms to create a motivation for the private sector to enter PPPs agreements with the government. Fennell (2012) looks at the gender equality dimension in the implementation of PPPs in education. The study focuses on Pakistan as a case study. The author finds that without governmental decision to start building in a gender mainstreaming approach, the PPPs do not help advance gender equality.

Within the same focus, Carlsen (2022) studies an interesting PPP model emerging in the education sector in Denmark to develop a new secondary school, where it lacks formal

agreements and depends on the manager's and the partner's relationship. The study points out to the sharing of "common vision across institutional boundaries between the public and private sectors" as an impact of this personal familiarization.

Furthermore, some studies look at the pre-conditions for PPPs in education. Wong (2015) explores the socio-political preconditions for PPPs in education in Singapore and Hong Kong. The study notes that PPPs are "viable only" when the state does not view the PPP agreements in education as a foe, and when there are suitable non-state partners. Lopes & Caetano (2015) looks at the same issue of preconditions but on the firm-level in Portugal. Empirical evidence shows that larger firms and "relative higher leveraged" firms attract more PPP projects (ibid).

2.2.2 PPPs in Technical Education

Most of the literature on PPPs in technical education is an assessment and evaluation of the PPP model implemented in the TVET sector in a certain context. Some of the studies assess the model in one country/region, while others conduct a comparative study of two or more contexts where PPP was implemented in TVET. However, generally, the focus remains largely on TVET programs in developing countries in Africa and Asia. Examples of studies that look at countries include Manyonge & Kyalo (2020) looking at the case of PPP in TVET in Kenya, and Paulinus & Chiduhiegem (2014), Ikechukwu & Najimu (2012), Baritule et al. (2021), Okoye & Chijioke (2013) & Atsumbe et al. (2014) looking at the case of Nigeria.

Some studies compare different countries to draw on lessons for improvement. For instance, Amornvuthivorn (2016), where the author compares PPPs in TVET in Singapore and the US, drawing on lessons for the model in Thailand. Key lessons include empowering local actors, actively engaging private stakeholders, and having a long-term strategic plan that aligns with the national plan.

Some other studies look at regions (Oviawe, 2018; Towip et al., 2021). Towip et al. (2021) looks at Southeast Asia, assessing the implemented PPP model from the TVET institutions' perspectives. The study finds positive perspectives on the model, where the implementation of PPPs improved the workforce skills and its performance and focused on demand-oriented fields.

Oviawe (2018) looks at some TVET reforms in Africa, examining the need for PPP as it provides TVET with new technologies, tools, and equipment, fosters youth employment, and addresses the needs of the industries. PPP in TVET is needed as "TVET institutions and their programmes are ineffective and of low quality" (ibid, p. 76). Governments in Africa face the challenge of providing adequate funding to improve the infrastructure needed in most TVET institutions. Ayonmike et al. (2013) mentions the inadequate classrooms, electricity and water supplies, and the lack of machines and tools needed in TVET learning. In some cases, TVET institutions suffer from poor hygiene conditions, which as examined by Okeshola (2012), is a contributing factor to the poor retention and participation of girls in TVET. Accordingly, PPP in TVET is thus encouraged to provide the adequate infrastructure needed. This argument is also stressed in the literature studying TVE in developing countries, where, for instance, Foster (1977) argues that the provision of TVE in developing countries does not help its graduates in acquiring the needed skills in the job market, and thus, the study recommends TVE to be financed and provided by the private sector.

2.3 Technical Education and PPPs Scholarship in Egypt

2.3.1 Technical Education in Egypt

Studies examining technical secondary education in Egypt can be classified into three main streams. The first are studies published in Arabic by national academic journals at Egyptian public universities. The approach is educational; not policy-oriented, but the common theme is the studies' focus on identifying challenges in the technical education system and suggesting ways of improvement (Soliman, 2019; Mahmoud, 2018; Al-Mahdi & Atta, 2020; Salm, 2017). Soliman (2019), for instance, studies the challenges facing the improvement of technical education in Egypt in light of the European Framework for Quality Measurement (EFQM). The study is, however, descriptive. Similarly, Mahmoud (2018) relies on the descriptive method to study some of the literature on technical education and identifies the "contemporary global trends". The study includes various recommendations on how to develop the technical education system such as modifying the laws to enable a partnership between the companies and technical schools (p. 28).

In addition to these studies, and similar to the descriptive nature of the studies in this stream, Salm (2017) examines the challenges that can face the Egyptian technical education in light of the current knowledge economy, recommending introducing "radical reforms" in the system to meet the requirements of the knowledge economy. An example of these reforms is training the student to acquire self-learning skills.

Also, another descriptive study by Al-Mahdi & Atta (2020) analyzes the development of technical education in Egypt through focusing on a value-based management system. They rely on surveys sent to 270 teachers in three governorates: Red Sea, Qena, and Menofia. They find that trust ranked first among the values reported important by teachers, followed by justice, participation, and clarity. Statistical analysis showed that the value ranking differed based on the educational qualification of the teacher and their years of experience. Variables such as gender, type of technical school, or governorate did not have statistical importance.

Some studies such as Howayl et al. (2017) & Sherif (2013) focuses on particular school systems. Both Sherif (2013) and Howayl et al. (2017) examine the dual-system schools. While Sherif (2013) provides a general overview of the system, its challenges, and opportunities; Howayl (2017) studies the societal obstacles that hinder further development in the Dual-System in Assiut governorate in particular. Through interviews with the schools' teachers, Howayl (2017) notes one of the main challenges is the existing gap between the dual-system schools and the job market in Egypt. Thus, the study recommends new majors and departments to be introduced to the dual system to ensure the skills learned at schools meet the new job market needs and demands. On the other hand, Sherif (2013) conducted interviews with most stakeholders in the dual-system schools, and thus, notes other challenges such as the desire of a considerable number of secondary technical education graduates to pursue higher education, and thus, this means their loss in the labor market.

The second stream in the literature seems to be more focused on the returns to schooling at technical schools (Tawfik, 2008; Abughattas, 2016). Tawfik (2008), for instance, analyzes the "performance" of technical school graduates in the Egyptian labor market over the period of 1998-2006 in terms of the differences in incremental wages across the various sectors versus

graduates from General Secondary schools. One of the study's findings is the low return of both secondary and higher-technical education because of the "oversupply of graduates" since the mid-1980s in Egypt. Secondary education in particular was found to provide no return to its graduates when it comes to employment in the private sector. A similar observation was noted by Abughattas (2016) in her study on returns to schooling at technical education schools in the textile industry, where she points out that "despite labor surplus in the country", there is a labor shortage in the sector. She illustrates that the "shortage of technical skills and low quality of learning among graduates of technical schools" are some of the major reasons behind this gap in the labor market.

Two studies explore the impact of technical education on other variables such as economic growth (Elish & ElShamy, 2016) and labor productivity (ElObeidy, 2016). For instance, Elish & ElShamy (2016) explore the "relationship between the students' enrollment in technical education and economic growth in seven selected MENA countries over the period 2003-2013" (p. 65). The authors find that there is a positive and significant relationship between the students' enrolment and economic growth (measured by per capita growth rate). However, the study points out to some structural problems in the technical education system such as its linkage to the labor market. ElObeidy (2016) also refers to this problem when examining labor productivity as one of the factors in having low productivity levels.

The third stream compares the Egyptian technical education system to technical and vocational education systems in other countries. Al-Sayyid (2020) compares the Egyptian system to the technical education system in three Latin American countries in particular; Brazil, Argentina, and Mexico due to their success in developing technical education. The study recommends various central and local changes. An example of a central change is establishing a system to follow-up with technical education graduates in their workplaces to examine the extent to which the curricula provided to them are suitable to the labor market demands and needs. Moreover, interestingly, one of the study's recommendations based on the Brazilian, Argentinian, and Mexican experiences is inviting the private sector to partner with the government in financing technical schools (p. 62).

Similarly, Morad (2017) compares the Egyptian technical education with the Finnish technical system, recommending various reforms to be taken in the former based on the latter. One of them is ensuring equipping students with not only knowledge and skills, but also the proper tools to develop on a personal level. She also recommends that MoETE would issue regulations to ensure that the firms and companies provide the students with the required training as part of the practical experience on which the technical education models in Egypt are based.

2.3.1.1 ATS

Studies about ATS schools remain limited. Currently only two recent studies provide some context to the specific ATS system (Soliman, 2021; Elbitar, 2019). For instance, Soliman (2021) studies introducing digital green education for students of ATS schools in light of the recent policy focus in Egypt on green energy. The author relies on quantitative methods, whereby she used SPSS to analyze surveys she sent asking students the challenges, the demands, and the requirements needed to introduce digital green education in the ATS system. One of the findings is the need to increase students' awareness about green technology, and to develop strategic plans in the schools to move into the digital green education.

In addition, Elbitar (2019) examines ATS as a way to improve technical education in Egypt. He notes the importance of this model in providing the needed skilled technical labor which is important for Egypt's development strategies. In proving so, the author refers to various literature pieces that indicated the need in the Egyptian technical education to revise the curriculum and the approach of teaching. The study, however, is descriptive as it states the development of the ATS schools, its aims, the main components of the ATS curriculum, and lists most of the ATS schools at that time, and each's admission requirements. The study concludes with recommending expanding the ATS model to be the way forward to improve the whole sector in Egypt.

2.3.2 PPPs in Education in Egypt

Literature examining PPPs in Egypt have mostly been focused on sectors other than education such as infrastructure projects (Selim, 2022; Khodeir, 2019), and tourism (Talaat, 2014; Ghanem et al., 2022), or on analyzing PPPs legally and financially (Wahab, 2015; El-Kholy & Akal,

2020). Only three studies look at PPP in education in Egypt (Helmy et al., 2020; Allam, 2021; Afridi, 2017).

The first study examines the "critical success factors" to "guarantee the implementation of successful public private partnership projects in the education sector in Egypt" (Helmy et al., 2020). Factors are political, legal, financial, managerial, operational, and economic. While all factors are of significance for the positive implementation of PPPs in education in Egypt, the most significant are the managerial and operational factors, followed by legal, political, economic, and financial (ibid). The focus of the study, however, is a PPP project under the Ministry of Finance's central unit of PPP to construct and operate language schools in partnership with the private sector (ibid).

The second study by Allam (2021) examines decentralization of education models in Egypt over the period 1990 to 2016. The decentralization models examined are PPP, community schools, and school-based management. The article identifies key actors and mechanisms in each model. International agencies are argued to have used "coercion" through funding and "persuasion" through presenting these models as matching "political sponsors' interests", in addition to the "bounded-rational learning" by national actors. In exploring the PPP model, Allam (2021) studies the same type of schools that Helmy et al. (2020) explored, which are under the Ministry of Finance's unit of PPP.

The third study was a book chapter by Afridi (2017) exploring the rise of the PPPs in global education policy and looks at Egypt as a case study. The study analyzes the internal and external actors' roles in promoting PPPs as part of the educational reform in Egypt, and the relevance and impact of this reform within the context of post-revolution Egypt. Afridi (2017) argues that the model raises important questions about "whose pedagogy and interests are being promoted" (p. 167). While this study helps in understanding the framework of PPPs operation in Egypt, it was conducted before the launch of ATS schools in 2018, and thus, it does not mention the model.

Accordingly, to the best of the author's knowledge, no studies were conducted to analyze the ATS schools or its PPP model. In fact, Helmy et al. (2020) mention in their study that they could

not find studies about PPP in education in Egypt except one study conducted by Afridi in 2017. Accordingly, this study aims to contribute to both the literature on PPP in education in Egypt and to the literature on technical education in Egypt, through analyzing the PPP model implemented in the ATS system.

3 Policy Context of TVET in Egypt

3.1 Technical education in Egypt

3.1.1 Technical education systems and models

At the pre-university level, generally, the enrollment rate in technical secondary education remains high in Egypt throughout different years. In 2019, technical education attracted "more than half of Egyptian secondary students" (Mohamed et al., 2019) with 1.8 million students enrolled in over 2266 technical secondary schools (CAPMAS, 2019 as cited in ILO, 2021). In 2020, the number of students in technical secondary education was recorded as higher than those in the Thanwayya Amma system (Abdel-Hafez, 2020). According to CAPMAS (2022), in 2020/2021, enrolled students in traditional secondary technical education only exceeded 2 million (2,132,597) compared to 1 million and 900 students (1,915,785) in the general secondary education system. In November 2022, the number of students enrolled in technical education exceed those enrolled in general secondary education, where the former reached 2.2 million students compared to 1.9 million enrolled in general secondary education (European Training Foundation, 2022).

This percentage reflects the enrolment percentage in the different forms of technical secondary school systems. As previously mentioned, there are four technical secondary school systems that serves as an alternative for general secondary schools. These technical secondary school systems have been initiated and developed in Egypt over time.

Traditional Technical Secondary Schools (TSS) are the oldest form of technical education in Egypt, is provided by the MoETE, and have four main specializations. Within the industrial specialization, there are over 60 specialties including mechanical, electrical installations, furniture production, automotive, and ready-made garments (ILO, 2021). Commercial technical education offers various specialties to qualify for administrative, purchasing, and warehousing jobs. Hospitality includes majors such as housekeeping, kitchen, and restaurants services. Agricultural offers specialties of animal production, agricultural mechanization, and food processing (ibid). The system of these schools relies mostly on theoretical content with very little

training provided. Al-Bahwash (1993) argues that most of the industrial and agricultural graduates does not participate in the production process, and thus, this education "cannot become a tool for development and progress, instead being nothing more than a waste of time and effort for those who expand it" (p. 201). In addition, in a report by the World Bank (1986), one of the most serious problems identified in the technical secondary education system is the lack of training instructors of practical skills that has been exercised in an industrial environment.

By the mid-1800s, a new technical secondary school was established in Egypt by St. John Bosco, an Italian saint–educator (Don Bosco, 2023). These Italian schools became latter known as "Don Bosco Schools" as it is managed by the Don Bosco representing the Italian Ministry of Education (Don Bosco, 2023; ILO, 2021), and accordingly, Don Bosco schools are considered as non-governmental schools (ILO, 2021). All courses provided by Don Bosco are tailored to meet the Italian higher education standards. Students graduate with a degree recognized by the Italian Ministry of Education, the European Community, and the Egyptian Government (ibid). Through close cooperation with companies, Don Bosco schools are able to know the market needs in real time, and thus, update and change its offered programs and courses (ILO, 2021). There are currently only two Don Bosco schools in Egypt: one in Cairo and another in Alexandria (ibid).

This model is an initiative managed by the Italian Ministry of Education, and thus, it was until the 1970s, "following the abandonment of the Soviet support by Sadat" that we see a role for international organizations or foreign donors in technical education in Egypt (Antoninis, 2001, p. 18). Three WB projects started in curriculum diversification, teacher training, and skilled and semiskilled worker education upgrading. The WB remained the "largest funding source for such projects" until the 1980s (ibid, p. 18). In the 1980s, Egyptian policymakers drew their policies of expansion of technical and vocational education in a context of favorable predisposition of the international organizations themselves (ibid, pp.18-19). An example is the 1980 ILO report that indicated its "approval" for the expansion plans that were part of the 1981 reform (Hansen & Radwan, 1982, p. 267). Yet, problems in the traditional technical education schools persisted and remained evident with no solutions. In 1995, the Minister of Education points to these problems in a conference of the Society of Engineers, providing no answers to fix the existing schools,

where he relied on the new initiatives as the solution, particularly, the Mubarak-Kohl project at that time (Antoninis, 2001, pp. 19-20).

It is within this context that we see the Mubarak-Kohl schools (DS) gaining momentum. The DS started its operation in Egypt in 1994 based on a cooperation agreement between Egypt and Germany singed in 1991. This agreement happened during this time in particular in the context of the overall re-assessment of the German development policy on education in 1989 (King, 1991 as cited in Antoninis, 2001). Before this re-assessment, GTZ has refrained from exporting its model to some countries including Egypt (ibid). The first DS graduates were in 1998 (ibid). Since 1992, GIZ (previously GTZ) has been providing technical support the DS schools (ILO, 20203). It also works to support its governance, enhancing its quality of education, training its teaches and supporting its expansion (ibid).

The aim of the DS system was improving students' practical skills and thus, ease their transition to the labor market (Adams, 2010, p. 3). Accordingly, it is different from the TSS, where in the DS, students attend two days at a secondary technical school and the four other days in a firm/factory to receive their training (Adams, 2010, p. 3). This is unlike TSS, where students attend the school only (ibid). Unlike TSS, DS is for three years only (Amer, 2007, pp. 8 & 17). However, similar to TSS, DS has the same four main majors of industrial, commercial, agricultural, and hospitality, with various specialties in each major (Abdel-Hafez, 2020). Also, similar to TSS, tuition is free, where students only pay a small registration fee (ILO, 2021).

Regarding the admission, while both the TSS & Mubarak-Kohl require a certain GPA for each major, the latter requires additional documents and examinations to be eligible to enroll in one of its schools. One of these exams is the entrance exam, where the student is asked in subjects like Math, Arabic and English languages, and IQ questions. In addition, the student has to pass an interview and a medical examination to be considered eligible (Emthnat Masr, 2023).

Unlike the TSS system which offers one certificate from the MoETE, the DS system offers its graduates a certificate from the MoETE and another one from the National Center for

Technological Dual System (NCTDE) which falls under the Egyptian Federation of Investors Associations (EFIA) (Maher, 2013).

Thus, the two school systems of TSS and DS differ in their admission, curriculum, stakeholders (as the Ds includes the GIZ), and the international recognition of the certification. However, their study duration and tuition fees are similar.

In 2018, we see the establishment of another new model of technical secondary education, which is the ATS schools. While both the DS and ATS systems are similar in combining the theoretical knowledge with the practical skills and experience gained during the students' training, the model is inherently different. The DS system is administered and managed by the MoETE in partnership with GIZ, where the private companies only come as partners to provide trainings for students through the intermediary, the Regional Units for Dual System (RUDS) (Maher, 2013). RUDS is in charge of allocating students to the private firm/factory for their trainings depending on the available private firms/factories and the specialization of the student (ibid).

In the ATS system, there is no involvement of an international organization in the model (like the GIZ in the DS). Furthermore, the private company comes early on to, in fact, establish the school itself. The ATS falls within the Public-Private Partnerships (PPP) framework (STA, n.d.), where they are established as a collaboration between the Ministry of Education and Technical Education, the private sector employers in the labor market, and international accreditation institutes (ETF, 2020). Thus, ATS companies are actively involved in contributing to the development of the curriculum (Eni, 2021) – as will be explained in the next chapter in detail. Thus, there is also a difference in the curricula in each system. This is unlike the system in Mubarak-Kohl schools, where the firms/factories serve as a mere workplace to offer students the needed training (Adams, 2010, p. 3), and thus, do not contribute to the curriculum development. To offer this training in the DS system, there is "no formal contract with the government the private sector"; however, there is a "tri-partite contract that is singed between the school, the company that train the student and the legal guardian of the student" (UNESCO, 2019, p. 22).

With this heavy role that the private company plays in the ATS system, unlike the DS model, we also see differences in the admission process. DS requires a certain GPA for each major. This is unified across the different DS schools. This is not the case with the ATS system, where each school decides on the needed GPA – will be explained in the next chapter in detail.

Moreover, the certification that the student gets differ in each school system. The ATS model offers an internationally accredited certification, unlike the DS system. According to the ILO (2021) report, ATS and ITEC are the only two technical education systems in Egypt that offer internationally accredited certificates. The Don Bosco offers certificates from both the Italian and Egyptian governments; however, the Italian certificate is only valid in the EU, according to the school's official website (Don Bosco, 2023a).

To conclude, the four models mainly differ in the governance of each school system, which is manifested in differences in the stakeholders involved in each system, admission, curriculum, and international recognition of the graduation certificate. Traditional technical schools are owned and operated by the Egyptian government. The Don Bosco is, however, owned and run mainly by the Italian government. The DS is operated by the MoETE in partnership with GIZ. The ATS falls within the Public-Private Partnerships (PPP) framework (STA, n.d.).

Despite these differences, in order to enroll in a higher education institution, all technical school graduates prefer to take the "equivalent certificate" to equate their education to that of the general secondary system (Azzazy, 2022). Generally, admission to a public higher education institution[5] is based on "*Tanseeq*"; that is, the student's score in their last high school year will determine which faculty and university they will get into from their submitted preferences. The scores that each faculty and university require varies from one year to another (OECD, 2015, pp. 47-48). Faculties and universities ask for a higher score when you are a technical education graduate compared to a general secondary (*Thanawayya-Amma*) graduate. Accordingly, what technical education graduates do is study and take the "equivalent certificate" to equate their

[5] This system only applies to public universities and higher education institutions. Students apply directly to private and non-profit universities (Leila, 2023).

education to that of the general secondary system, and thus, get a better chance of getting into their desired public faculty/university (ATS graduate, August 2023).

Graduates of Don Bosco, DS, and ATS schools still fall under the normal procedures as their peers in traditional technical schools when it comes to applying for universities/higher education institutions. Accordingly, they will have to take the equivalent certificate if they want to ensure better chance of getting into their preferred faculty as this certificate will equate them with the general secondary one, and thus, their desired faculty can admit them with lower scores compared to those who only have technical education certificate and did not do the equivalent certificate.

The only exception for technical education students from this requirement of the equivalent certificate to better-up their scores is when the graduate's scores are higher than a certain score. The exact score depends on the sector of technical education. Meaning that, commercial technical education graduates with a score higher than 98% do not need the equivalent certificate as they will automatically be treated like a general secondary graduate in terms of the needed score to enroll in a faculty/university (OATS graduate, August 2023).

3.1.2 Expenditure on Technical Education in Egypt

The Egyptian government expenditure on technical secondary education represents 60% from the Technical and General secondary education budget (UNESCO, 2019, p. 54). In 2005/06, the total expenditure on both general and technical education was 4.571 billion EGP[6] (ibid). 2.743 billion EGP went to technical education, representing 60% of the total expenditure. The average government expenditure per student in technical education is 1,389 EGP, and in general education is 1,475 EGP (ibid). Despite this lower average expenditure per student in technical education compared to general education, technical education consumes 60% of the budget due to the higher percentage of students enrolled in its systems (ibid).

[6] The researcher is using the statistics mentioned in the UNESCO 2019's report as updated numbers could not be found to indicate the expenditure in the general education and technical education. The latest report by CAPMAS (2023) – Egypt in Numbers, mentioned on page 167, the government public expenditure on Education by state public budget for 2021/2022 and 2022/2023; however, it classifies the expenditure into pre-university education, and university education. Thus, it does not provide the expenditure on each system: general and technical education systems.

This high expenditure on technical education does not have a high return, given that most of this expenditure goes to wages, rather than covering "developmental expenses and investments" such as teaching materials, equipment, and infrastructure (UNESCO, 2019, p. 11). UNESCO's report (2019) points that without external funding, there will be no option but for the government to put the available budget into the recurrent expenses (wages) leaving almost no budget for the development of the programs, which would negatively affect the quality of education provided (p. 11). Within this context, the MoETE embarked on initiatives in the Technical Education 2.0 Transformation that would reform the system to include the private sector to fix this issue of funding. This includes the ATS model, where the private company finances the schools, needed equipment, and infrastructure (UNESCO, 2019).

It is worth noting that an assessment of the government spending on the ATS model in particular was not possible due to the absence of current information pertaining to this model. The only source that might give an indication is an article in May 2022 that mentions the expenditure planned for FY2022-2023 on the Japanese schools, Nile Egyptian schools, STEM schools and 20 new ATS schools combined is 5.2 billion EGP out of nearly 563.8 billion EGP dedicated to education (Enterprise, 2022).

3.1.3 Demand and supply of technical students in the Egyptian market

The current relationship between demand and supply of technical workers in the Egyptian labor market shows that there are two cases that vary based on the major/industry. The first case is that there is a demand that is not met, despite the increasing supply. This was attributed to various factors that vary according to the sector as well. One of the factors is the mismatching between the needed labor market skills and the skills the technical education graduate has (Egypt Network for Integrated Development, 2010). Another factor is the low demand for technical graduates in certain specialties such as the agriculture schools, according to a study conducted in 2006 (Hinchliffe, 2006).

The second case is the complete opposite, where there is a severe shortage of supply in certain industries despite the increasing demand. An example is a study conducted by Farag (2008) that

looks at the potential reasons behind the shortage in nurses in Egypt. She identifies various reasons that include the nurse wage levels and working conditions in Egypt as well as the supply of nursing education "entirely" by the public sector (p. 2).

There is no current publicly accessible official statistics found on the current supply of technical workers through the ATS system or the projected supply. Thus, this research was not able to assess this. Data might be available in the next years, and it is highly recommended that future research looks into the supply of technical workers through this school and its projection to understand its contribution to the local labor market.

3.2 Policy Framework for the PPP – ATS Model

As one can notice given all the previously mentioned models of technical secondary education, until the launch of ATS schools, there was no PPP models in technical secondary education in Egypt among the possible education systems. There was, however, PPPs in general education. In late 2006, the Egyptian government undertook "one of the largest PPPs in the education sector" (LaRocque, 2008, pp. 29-30). The government provided land to the private sector while the private sector designed, constructed, financed, and furnished public schools[7]. As such, the private sector provided construction and infrastructure maintenance (i.e., non-educational services). The contracts were 15- to 20-year contracts with private partners' maintaining 300 schools in 23 governorates. In 2007, with the private sector's positive response to the initiative, it expanded to cover 2,210 primary and secondary schools by 2011, valued in 2008 at 11 billion EGP (LaRocque, 2008).

However, in September 2018, the government, mainly being the Ministry of Education and Technical Education (MoETE), partnered with the private sector to provide and co-manage a new secondary technical educational system called Applied Technology Schools (ATS). This is considered a new form of partnership, where previously, as noted, the partnerships included only financing and constructing public schools. This reflects a "shift in the policy agenda" towards a

[7] This initiative did not have a specific name for these schools. It was merely agreements signed for a number of schools.

more demand-oriented vision of technical education, and a policy desire of an increased collaboration with stakeholders (European Training Foundation, 2021, p. 6).

There has been changes in the policy framework to encourage this new model of PPP in technical education. On the 1st of June 2017, a new investment law entered into force, setting the rules in Egypt for all local and foreign investments (Law no. 72 for 2017). For the first time, it states explicitly *technical education* as one of the areas of investment, whereby the investor that will invest in *technical education* will receive income tax incentives, according to Article 15 of Chapter 3 of the law, as it states,

> "Toward achieving the goals of the comprehensive and sustainable development, the Investor may dedicate a percentage of his annual profits to create a social development system, outside of his Investment Project, by participating in the following fields, in whole or in part:
>
> 1. Take the necessary action to protect and enhance the environment;
> 2. Provide services or programs in the areas of healthcare, social care, or cultural care, or other development areas;
> 3. Support the technical education or the funding of research, studies, and the awareness campaigns aiming at developing and improving the production, in agreement with any of the universities or scientific research institutions; and
> 4. Training and scientific research"
>
> (Law No. 72 of 2017, p. 16)

This provided an opportunity for the private sector to engage in the ATS schools (European Training Foundation, 2021).

3.3 Structure of the ATS Model

ATS is considered as a "new system of technical education", based on partnership between the government (represented by MoETE) and the private sector (MoETE, 2020). ATS schools are explicitly considered as a "PPP model" by the MoETE. The private partner signs a protocol agreement with the MoETE for a duration of 6-10 years, with a possibility of expanding the contract for the same period indicated in the initial contract (UNESCO, 2019). Based on this

agreement, the ministry provides facility and pays salaries of teachers, and the industry partner provides management, accredited education system, training for the students (NASS Academy, n.d.).

ATS schools were established with the aim of providing students with high technical skills and capabilities, and thus, supplying the labor market with skillful workforce who is able to deal with modern technology in the high-demand industrial sectors, according to Deputy Minister Mohamed Megahed (Daily News Egypt, 2020). It also aims at applying international standards in teaching and training methods in addition to a competency-based curricula to supply the labor market with competent internationally competitive graduates (ibid).

The main principles on which the ATS model was based, according to a report by UNESCO (2019), are as follows:

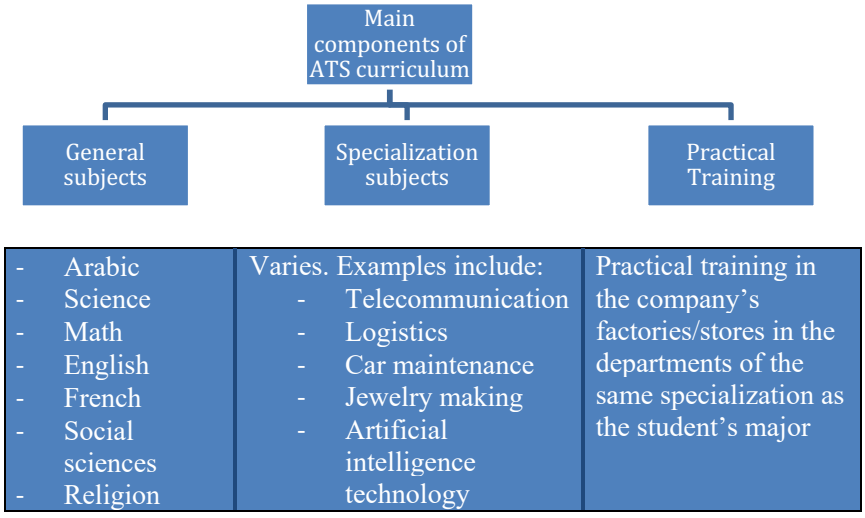
- Quality: there is an uncompromised focus on ensuring the model has international awarding/accrediting bodies to the system. This is done by the private sector partner.
- Work-based Learning: practical training is integral to the design of the model to ensure graduates have the skills and knowledge to compete in the labor market.
- Demand-driven: the industrial partner ensures that the model continues to be driven by industry demands and priorities locally and globally.
- Real change: the industrial partner ensures promoting a culture of change in the system, where work ethics such as efficiency and productivity are the norm.
- Transforming the business environment: the model can enhance the business environment in Egypt, producing graduates that would transform Egypt into “a global manufacturing destination”.

Each private company managing a school has the right to decide on the required minimum academic score for students to be admitted into their school. Thus, some schools require higher grade scores than others (MoETE, 2023a). Moreover, interestingly, each school offers an extra item as part of its set of advantages to attract applicants. For instance, some schools add lunch being provided along with school transportation. Others add that each student will get a tablet (ibid). Majors vary from one school to another, as specializations within each ATS school is

determined by the industrial partner, influenced by his area of specialty (ILO, 2021). For instance, WE Telecom company offers three majors at their schools: telecommunication, networks and information security, and website and software development (MoETE, 2023a).

The ATS curriculum depends on a competency-based curriculum, provided by the MoETE. This is considered a significant change in the curriculum development in technical education. Scholars studying modern approaches of technical education have agreed on the importance of having a 'competencies approach' to building curricula to ensure the adequate and needed development of the human capital that is required for the labor market (Moustafa, 2016; Alastair, 2006; Lekes et al., 2007). It consists of three main components: general subjects, specialization subjects, and the practical training that the student receive. Figure 2 illustrates these three main components.

Figure 2. Main components of the ATS curriculum



Source: Author based on MoETE, 2023

4 Conceptual framework

Public-private partnerships (PPPs) have always been under debate within scholarship on its definition, conceptualization, origins and models for measuring success (Clerck et al., 2012, p. 246; Hodge et al., 2010, p. 3). The historical origin of the concept and the degree to which it presents a "new" policy solution to the public infrastructure provision is also contested (Hodge et al., 2010, p. 3). However, at its core, PPP remains a "classic public policy issue", and constitutes a technical phenomenon as well as a political tool for governments (Hodge et al., 2010).

As mentioned in the literature review chapter, various scholars define the concept differently based on their discipline/approach to PPP. Hodge & Greve (2007) "loosely defines" PPPs as "cooperative institutional arrangements between public and private sector actors" (p. 545). International organizations also have attempted also at defining PPPs. For instance, OECD (2019) defines PPPs as "long term agreements between the government and a private partner whereby the private partner delivers and funds public services using a capital asset, sharing the associated risks". The essence of PPPs is ensuring that it represent value for money for the public sector (OECD, 2019). PPP in education can be defined broadly as contractual agreement between the state and a private entity "in any aspect of education provision and management" (Patrinos et al., 2009).

While taking into consideration the different motivations of these definitions, this study relies on the Egyptian Ministry of Finance's definition of PPPs as "is a long-term contractual relationship between the public sector and the private sector for the purpose of having the private sector deliver a project or service traditionally provided by the public sector" (Ministry of Finance, 2013). As this definition is by an Egyptian governmental body, it will help to construct the basis on which PPPs in ATS were defined and how participants in the study interview had in mind with this definition.

Several models have conceptualized the categorization of PPPs (Hodge & Greve, 2007; Zarco-Jasso, 2005). For instance, Hodge & Greve (2007) categorize PPPs into main five "families of possible partnerships" based on the governance type (p. 5). These are institutional cooperation,

long-term infrastructure contracts, public policy networks, civil society and community development, and urban renewal and economic development, where local economic development is pursued (ibid, pp. 5-6). The categorization relies on the governance type in terms of the partner entering the agreement and the aim of the agreement.

Zarco-Jasso (2005) divides them based on the type of the agreement/contract such as O&M (operations and maintenance), BOOT (build, own, operate, transfer), BTO (build, transfer, operate), and DBFO (design, build, finance, operate). Zarco-Jasso (2005) categorizes based on the assigned roles in the partnership. Thus, together they categorize based on the type of partner (civil, private, etc.), the aim of the agreement (which sector), and the role of the private partner.

This study draws on two ways of categorization of PPPs in particular, which will be detailed in the following sections. The first is based on the Luxembourg Development Cooperation Agency, an international cooperation that is an operational pillar of various bilateral cooperation systems, with extensive experience for over 40 years in PPPs globally in over 10 countries, especially PPPs in TVET. Moreover, the agency has significant knowledge production, producing annual reports, capitalization notes, technical and guidance notes, sector notes– among others. Accordingly, the categorization is based on real on-ground ePPPs. PPPs are categorized into operational ePPP and educational ePPP, based on the aim of establishing the ePPP in each context.

The second categorization of PPP is by Gopalan (2013). In her book, “PPP Paradox: Promise and perils of public-private partnership in education” the author studies various international experience in applying ePPP, looking at the US and India in particular, but also mentions other international experiences throughout the book. Chapter 2 of her book presents “an original typology of PPPs, based on extensive secondary research” (p. xviii). This study relies on Gopalan’s categorization in particular because of two reasons. Firstly, she used an inductive approach in drawing this classification from different countries. Secondly, it is based on the model of applying PPPs in educational systems in particular, and thus, fits with the scope of this research.

Putting these two categorizations of PPPs together complement each other for the purpose of this study, where Gopalan (2013) helps in generally mapping out the PPP model implemented, and the Luxembourg Development Cooperation Agency helps in categorizing the aspects of PPP. Moreover, they are comprehensive of most elements mentioned in the literature on categorizing PPPs. At the same time, it is important to note that the study did not adopt the well-known continuum of PPPs in education by Patrinos et al. (2009) as it was based on classifying PPPs by the level of the private sector engagement, given that the source of funding is the public sector, which is not the case in the ATS system in Egypt.

4.1.1 PPPs in Education- Gopalan (2013)

According to Gopalan (2013), typology of PPPs is based on four main interacting factors[8]: scope, scale, method, and motive. These four factors also help evaluate the PPPs to know whether they are of good quality, sustainable, and collaborative (ibid). Thus, it helps in building an understanding of the quality of education that PPP foster, the scale at which they operate, the political environment in which they operate and the aims that drives this partnership. Table 2 illustrates each of the four factors.

Table 2. Key factors in identifying PPPs in TVET

Factors			
Scope	Refers to whether PPP is focused on improving a specific aspect of education or takes a comprehensive approach to address systematic problems	focused or systemic	*Focused:* PPPs tend to be over a short period of time; 1-3 years with a defined implementation budget and clear aims. Examples include remedial literacy programs, teacher training courses. *Systemic*: systemic reform of the educational system that involves all main stakeholders such as the government agencies, teachers, principals, and students. This includes a policy directive to implement this change.
Scale	Refers to whether it is a pilot or a large-scale policy-driven effort	experimental or policy-driven	*Experimental*: starts with a small project in a school

[8] Scale and scope were also used in the literature to describe and analyze PPPs (Ball, 2007).

			Policy-driven: the model become a policy driven model for the entire country within few years.
Method	Refers to the type of partnership	top-down as in a takeover, or complementary	*Takeover*: takeover indicates taking full control of the school(s). In some cases, this is considered as a "last resort measure" where public education fails to achieve its aim (Gopalan, 2013, p. 41). Additionally, in some cases, different private actors- "providers"- are assigned a specific number of schools each. Travers (2003) points out that this "diverse provider model" allows for differences in the approach each private entity is implementing in their set of schools. *Complementary:* public and private entities work together in a collaborative way, complementing one another's role to achieve changes needed in the education system. It is based on a memo of understanding, policy directive, or an informal understanding. It also usually does not start with a clear defining role as "complementary"; however, it is clear during the agreement that it is not a takeover, and the private sector is adding value to the education system, not filling in some gaps.
Motive	Refers to whether the PPP motive is self-interest (profit) or public interest	profit or social	*Profit*: for profit companies are more likely to be contractors than partners. Also, some of them, who control school finances, bring in activities that will generate them profits.

Source: developed by the author based on Gopalan (2013)

Gopalan (2013) views a focused, policy-driven, takeover, for-profit initiative as "completely contrary to the goals and purposes of public education" (p. 1). On the other hand, systemic, policy-driven, complementary, social initiative is viewed as "holding great promise for the improvement of teaching and learning" (ibid). Gopalan (2013) argues that adequate controls need to be in place for the private management of public schools to ensure that learning is improved, and social stratification is reduced (pp. 9-10).

4.1.2 PPPs in TVET- the Luxembourg Development Cooperation Agency

LuxDev (2019) classifies PPP in TVET into operational PPP and educational PPP. The operational PPP is the involvement of the private sector in running a public TVET service that can take a form similar to a joint venture. It can take different forms of legal contracts with the government with various degrees of responsibility. PPP in this model is typically found in the Board of Administration and/or operational level in the management. It can take the form of one of the below six legal contracts: simple contractualization, public authority, public service leasing, public service concession, administrative long-term lease, and build, operate, and transfer. An educational PPP is when the private business upgrade and renovate the technical school/center through advisory services, training teachers, learning material, and quality accreditation. It happens when collaboration between the private and public sector takes place on an ad hoc basis. It is important to note that PPPs can be both operational and educational.

4.1.3 Study Conceptual Framework

The educational and operational categorization is helpful in generally understanding the partnership form and what each sector provides. The four factors provided by Gopalan (2013) will be utilized within these forms to better understanding the details of the partnership. Table 5 illustrates this idea further.

Table 3. Key elements in identifying PPPs in TVET

	Operational	**Educational**
Scope		
Scale		
Method		
Motive		

Source: Author

5 Research design

5.1 Research Rationale, Methods and Sampling

The research design is explorative with the aim of exploring the ATS system, mapping the public and private roles within the PPP, how the PPP model is governed, and highlighting the main implementation and coordination challenges and opportunities that different stakeholders face in the implementation of the model. Accordingly, the study relies on a qualitative research methodology, where the main research method is in-depth semi-structured interviews with stakeholders. Interviews are essential to understand the ecosystem and the main stakeholders involved and each's role, which is crucial in understanding the PPP model implemented. This is particularly true in this case where there are very limited reports on the ATS schools, and even those do not map or describe the system, and the roles of each actor in the model and/or within the school.

Semi-structured interviews were conducted with at least one person from each identified stakeholder. Identified stakeholders include: The MoETE, private company, academic partner, and students. However, the Applied Technology Schools Operation and Management (O&M) unit at the MoETE could not be reached for an interview. A total of twelve interviews were conducted, as follows: two from private companies, four from two different academic partners, four students and two ATS graduates. From the private companies, I interviewed a school principal at one of the ATS schools, and the executive director of another private company that manages an ATS school. Two interviews were conducted with NASS academy (academic partner), and two interviews with QDB (another academic partner). Overall, the interviews conducted encompassed experiences from three ATS schools.

The sampling techniques used are chain referral sampling with students, graduate, and private companies (Neuman, 2014, p. 275); while purposive sampling targeted specific the academic partners (Neuman, 2014, p. 273). The entry to the field was acquired through a social media post where I asked interested students to get in touch for an interview, and one of the ATS students got in touch. This student then referred me to other students, graduates, and the school principal.

The executive director of another private company that manages an ATS school and QDB staff were accessible through my personal networks. For NASS staff, I reached out personally to them via a social media platform.

Most interviews were conducted over the phone. The design of the interview questions was built based on the conceptual framework, where two sets of questions were asked: questions about the operational side, and questions about the educational side. In addition, in preparing the interview questions, an international development agency employee, active in technical education in Egypt but are not part of the ATS model or system, supported the development of questions. This informal consultation was to gain insights into what remains unclear in the field about the ATS model, and what questions they would ask a school principal or an executive director in a private company.

The semi-structured interview questions remained constant across stakeholders, except for graduates, where I added questions about the post-graduation life and their hiring process. Also, for the students, where I added questions about their experiences. Objectives for interviews with the students included knowing how the system is implemented and capturing their own experiences in the model; as well as understanding the hiring process for the graduates' interviews. The academic partners, and private companies were asked similar questions, while the objective was to hear answers to the same question from all stakeholders, in order to form a comprehensive idea of what is happening on the ground. This also helped to ensure triangulation of the data collected from these interviews to ensure the validity of the data collected.

5.1.1 Data Analysis

The study relies on a qualitative content analysis to explore the findings that was conducted manually by the author. In mapping out the ATS model, its stakeholders, and perspective roles, interviews were analyzed based on a deductive approach with a pre-set questions of who is doing what, who they interact in the system, and how. Answers to these questions were extracted from *each* interview. Interviews with the students were extremely helpful in drawing this mapping as they were the best in explaining how the system works. Their answers were validated through the interviews with private companies and the academic partners.

To understand the relationship and the dynamics between each of the three main stakeholders; MoETE, private companies, and the academic partner, interviews were coded analyzed thematically and based on inductive process, where key repeated themes were identified such as hiring and firing teachers, practical training, curricula development and accreditation. The same process was done for the challenges and opportunities.

Data collected was validated through cross-referencing different participants, and thus, applying triangulation of data (also known as participant triangulation), where data is drawn from different participants (Flick, 2004). Comparing each's responses provides a well-rounded understanding of the ATS and the PPP model applied.

5.1.2 Ethical considerations

All interviewees' identifying information is kept confidential in the research, with no mention to their names, or their school names throughout the research. The research purpose was explained to each participant and consent was granted before the start of any interview. No risks or benefits to the participants were associated with this study. Five interviews of the twelve were audiotaped on my phone after gaining the participant's permission. The remaining were not recorded given the participants' preference not to record. Lastly, there is no conflict of interest with any of the participants or the scope of this research as I am not affiliated with any of the stakeholders or work/engage with ATS schools or the stakeholders.

5.1.3 Limitations

One limitation in this research was the lack of interviews with the ATS operation and management unit at the MoETE, which could not be secured within the study timeframe. However, I tried to mitigate this lack of information by relying on online statements in press releases found on the ministry's website and in other news media outlets. Also, due to the limitations of time and resources, the sample was based in Cairo only.

6 Findings and Discussion

Based on the interviews conducted, this chapter presents the findings of the collected data on mapping the structure, governance, and coordination of the implemented PPP model in the ATS system. It identifies the stakeholders present in the structure of the implemented model, defining each's role within the model and within the internal school structure. It then explains the relationship dynamics between these stakeholders, and thus, it shows the governance and coordination of the implemented PPP model. In showing this, within each relationship, it identifies key areas of coordination and how it is implemented. This is based on the main identified themes from the interview data. Based on this mapping, the chapter categorizes the PPP typology according to the study's previously mentioned conceptual framework. After this mapping and categorization of the model, the chapter presents the key policy and operational challenges and opportunities in the model.

6.1 Structuring the ATS PPP Model

6.1.1 How ATS started

NASS academy was the only institution present in the initial meetings in 2017 and in 2018[9] at the MoETE during the very first talks about establishing ATS schools in Egypt (NASS academy manager, August 2023). At that time, NASS academy was acting as a "consultant" to the minister of MoETE at that time, Dr. Tarek Shawki, in developing the ATS model. The rest of the initial meetings attendants were individuals acting as advisors in their personal capacity (ibid). According to a high managerial person at NASS academy, "the aim of the ATS model was to create a technology-based education that is based also on more practical training and meets the industry's demands and needs" (NASS academy manager, August 2023). The idea of international accreditation came at that time, as he illustrates, to ensure that this system is acknowledged internationally.

[9] Before the launch of first three schools later in 2018.

PPP during these meetings was suggested as a model of the ATS system as the MoETE already had the schools and the teachers; however, it lacked the needed finance to manage and develop these schools. “The ministry has schools and teachers, but the need arose from the private sector partner to adopt these schools and finance it to develop it” (NASS Academy manager, August 2023). The motive for the private companies is the “return of investment”, which is manifested in providing skillful and well-trained graduates in the labor market that the private company can hire (ibid).

During the ATS first year (2018), NASS academy was the one approaching private companies, namely Talaat Moustafa Group, one of Egypt’s largest Real Estate Development companies, to partner with in launching the first ATS schools in Egypt (NASS Academy, n.d.; NASS academy manager 2, August 2023). The school had at that time 600 students majoring in five specializations, which are Electrical Systems, Air Conditioning & Refrigeration, Sanitary Networks & Systems, Architectural Finishes, and Carpentry (NASS Academy, n.d.). Having the goal of adding four more schools, NASS launched two more schools: WE Telecom “as the first ATS and the first technical school in the telecommunication field in Egypt” and B-TECH in the retail field (NASS academy manager, August 2023). NASS academy’s partnership with B-TECH lasted for two years and then QDB started being B-TECH’s academic partner. NASS still acts, however, as the academic partner for WE Telecom school (ibid).

6.1.2 Main Stakeholders in the PPP Model

The main stakeholders in the PPP model are the MoETE, the private sector companies and businesses, and the academic partner. The academic partner is selected by the private company. However, having an academic partner is not mandated by the MoETE, where the private company can choose to take on the role of the academic partner (which will be explained in the next section) (private company director, October 2022; school principal, July 2023). In this case, however, the private company have an academic partner in the sense that it develops its curricula and ensures its international accreditation. Until 2020, the only private company with no competitor that provided the services of an academic partner in the market was NASS academy.

Ministry of Education and Technical Education (MoETE)

Within the MoETE, two main units interact with the ATS schools. These are: Central Administration for the Development of Technical Education, and Applied Technology Schools Operation and Management (O&M) Unit. Both are headed by Dr. Amr Bosela. The ATS O&M unit is responsible, in partnership with the private sector company, for the operations of the schools. It also has a sub-unit within it, named "the Quality Assurance (QA) unit". The unit has seven main staff members (MoETE, 2021). Some of the positions and its *main* role is as follows:

1. Quality control specialist: follows up the implementation and activation of the quality assurance system in these schools in coordination with the Central Administration for the Development of Technical Education in the Ministry, within the framework of standards and development.
2. Professional development officer: plans and supervises the implementation of sustainable professional development for teachers and school administration in ATS, ensuring that they perform their tasks optimally in accordance with local and international quality standards, and bridges gaps in the performance of teachers and school administration by studying the teachers and administration needs so that these can be provided in their training.
3. HR officer: supervises and participates in the process of selecting faculty members and administrators, conducts the annual and monthly evaluation process for school staff, and sets tests for the teachers' recruitment.
4. Exams and monitoring officer: supervises the students' admission into the schools, evaluates their performance throughout their study in coordination with the industrial partner, and manages the exams.

The QA unit monitors each ATS school closely, ensuring that the buildings are safe, there are suitable places for classes, students receive their trainings, curriculums are being followed, teachers are not facing problems, and parents are not reporting any issues (school principal, July 2023). This monitoring is done through various visits to the ATS schools. As described by a school principal, this team is "the connecting circle" between them and the ministry (ibid). Moreover, the ministry frequently sends "*Mowageh*" – closest translation in English is an

academic advisor. The role of this guide is twin-folded. Firstly, they follow-up with the teachers to ensure that the ministry's curriculum (not the specialization curriculum[10]) is being delivered in a timely manner. Secondly, they monitor and evaluate the teachers' academic performance (school principal, July 2023).

Private companies

Private companies participating in the ATS model have varied from real estate developers such as Talaat Moustafa Group to retail companies such as B.TECH. It also includes companies working in the automobile industry such as Ghabbour and Volkswagen Group, and companies from the food industry such as Americana Group (MoETE, 2020). Within the ATS model, private companies are also referred to as "industrial partners", where they are the experts from each's industry.

Academic Partners[11]

NASS Academy

NASS Academy is a private company, established in 2012 with the vision of filling in the gap they saw in the market, which is that "technical education graduates are on one side, and the industrial sector is on the other. They are not connected" (NASS academy manager, August 2023). The mission is to "be part of the solution" to ensure that the technical education system is "up to the international standards and the industry expectations in Egypt" (ibid). Accordingly, NASS academy "develop and manage vocational training centers, technical education schools, and the programs that are taught in these schools and training centers" (ibid). NASS academy does not accredit curriculums or programs. However, the academy collaborates with international accreditation agencies such as SIEMENS, Schneider Electric and City & Guilds to provide accreditation and certification for each ATS school that the academy manages and, in each major to ensure that the program meets the international standards (ibid).

[10] Specialization curricula is to be supervised by the international accreditation agency, which the MoETE mandates on the private company so that the ministry, that does not have the capacity to supervise it, ensures the other part in the curriculum is correct (school principal, July 2023).

[11] There might be other private companies playing the role of an academic partner; however, NASS and QDB are the most known ones, according to the author's best knowledge.

Qualifications Development Bank (QDB)

QDB acts now as a competitor to NASS academy, providing the same services as an academic partner (QDB staff 1, August 2023). QDB is a private company, established in 2012 with the vision of reforming the technical and vocational educational sector in terms of quality and its perception domestically and internationally (QDB, n.d.). It did not, however, enter the ATS ecosystem until in 2020 (QDB staff 2, August 2023). As of 2023, QDB works with two ATS schools: Americana and B.TECH (QDB, n.d.a). Similar to NASS academy, QDB does not accredit curriculums or programs. However, QDB is the "exclusive authorized representative of UK's leading organization for work-based qualifications; City & Guilds" (QDB, n.d.). Thus, QBD provides accreditation of City & Guilds.

Future stakeholders – in the pipelines – ETQAAN

To understand the quality assurance measures/entities in the ATS model, it is important to be aware of the quality assurance concept in the general educational context. In 2006, The National Authority for Quality Assurance and Accreditation of Education (NAQAAE) was established "to serve as an independent accrediting body for all types and levels of education in Egypt", including the technical and vocational education (Barsoum, 2014, pp. 6-7). NAQAAE aims at preparing institutions for accreditation and granting them this accreditation. It is also tasked with coordinating and managing the National Qualifications Framework (NQF)[12]. The idea of NQF started in 2005 as an effort led by the European Training Foundation to establish qualification framework for the Egyptian educational system inclusive of all levels of qualifications (European Training Foundation, 2021).

Until 2021, NAQAAE was the main quality assurance institution for all levels of education and training in Egypt. In 2021, a new legislation was approved to establish a new quality assurance institution focused solely on technical and vocational education and training (TVET) (European Training Foundation, 2021). This came in light of the previously mentioned recently launched

[12] NQF aims at various goals; most notably, enabling inter-sectorial mobility with appropriate tools, being a reference for the qualification frameworks for different sectors, and permitting "with appropriate tools horizontal mobility between the TVET and the general education systems" (NAQAAE, 2020 as cited in European Training Foundation, 2021).

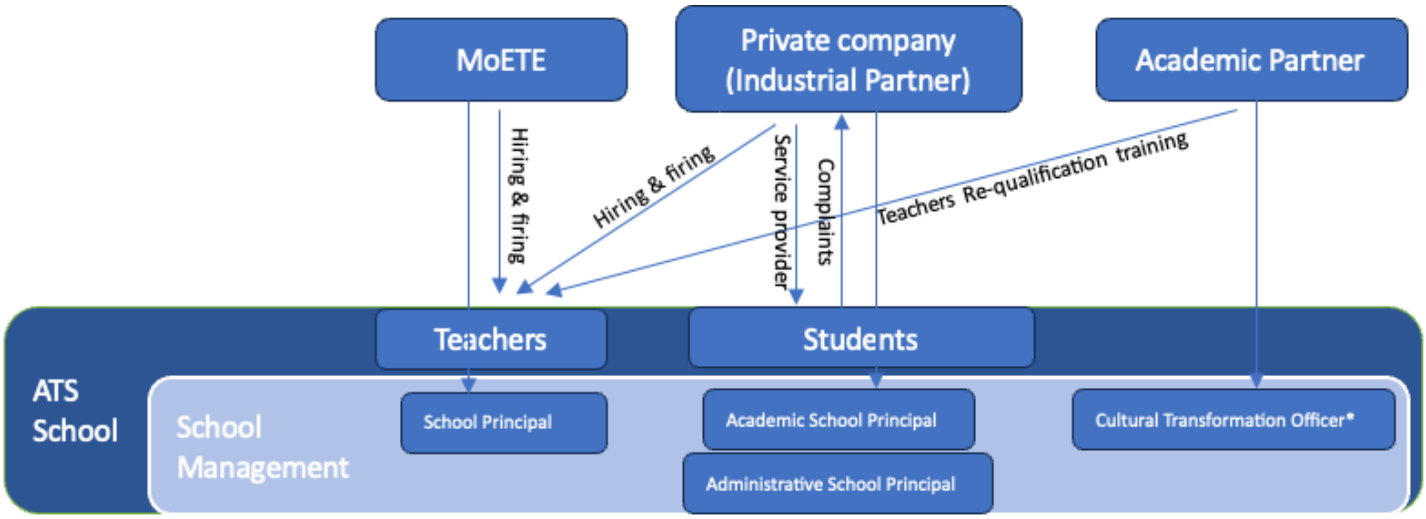
technical education strategy 2.0. The new entity is the Egyptian Technical Quality Assurance and Accreditation National Authority (ETQAAN). It was in October 2022 when President El Sisi signed Law no. 160 of 2022 to establish ETQAAN (MENA, 2022). Accordingly, the bylaws needed to support the operationalization of its functions and its organizational structure are still in development. A report by the European Training Foundation (2021) points out, however, that ETQAAN will operate through accredited experts who are not in-house experts (p. 10). The senior body of ETQAAN (Board of Trustees) will have government representatives (6 people) and private sector representatives from key economic sectors. The Board of Trustees shall then select 7 experts that will be tasked to form ETQAAN's executive council (ibid). It is important to note that at the time of writing this research, ETQAAN is still not established.

6.1.3 Internal School Structures

As evident in Figure 5, in each school, there are three managers/school principals; two are appointed by the private company and one by the MoETE (student, April 2023). One of the two principals appointed by the private company is the "academic principal", and the other is the "administrative manager" (ibid). The academic principal has all the authorities in terms of managing the school, students, and teachers. The administrative manager is in charge of the logistical matters related to the school such as the building safety. The principal appointed by the ministry acts like "an eye" in the school to ensure that all operations and teaching are running according to the model (school principal, July 2023). The ministry's principal also has the governmental official stamp that is needed for school and day-to-day operational paperwork (ibid).

When students have a problem with the teacher, system, or with another student, the student first report the issue to the behavioral counselor, and the academic principal is informed about it. The academic principal only intervenes when the problem escalates and/or needs higher intervention (school principal, July 2023). Nevertheless, students have access to directly report to the academic principal. For instance, during one of the interviews with the students, he mentioned that when he and his colleagues wanted to report a teacher for his inability to teach the content in an understandable way. Thus, they went directly to the academic principal (student, April 2023).

Figure 3. PPP Model of the ATS, on the school level



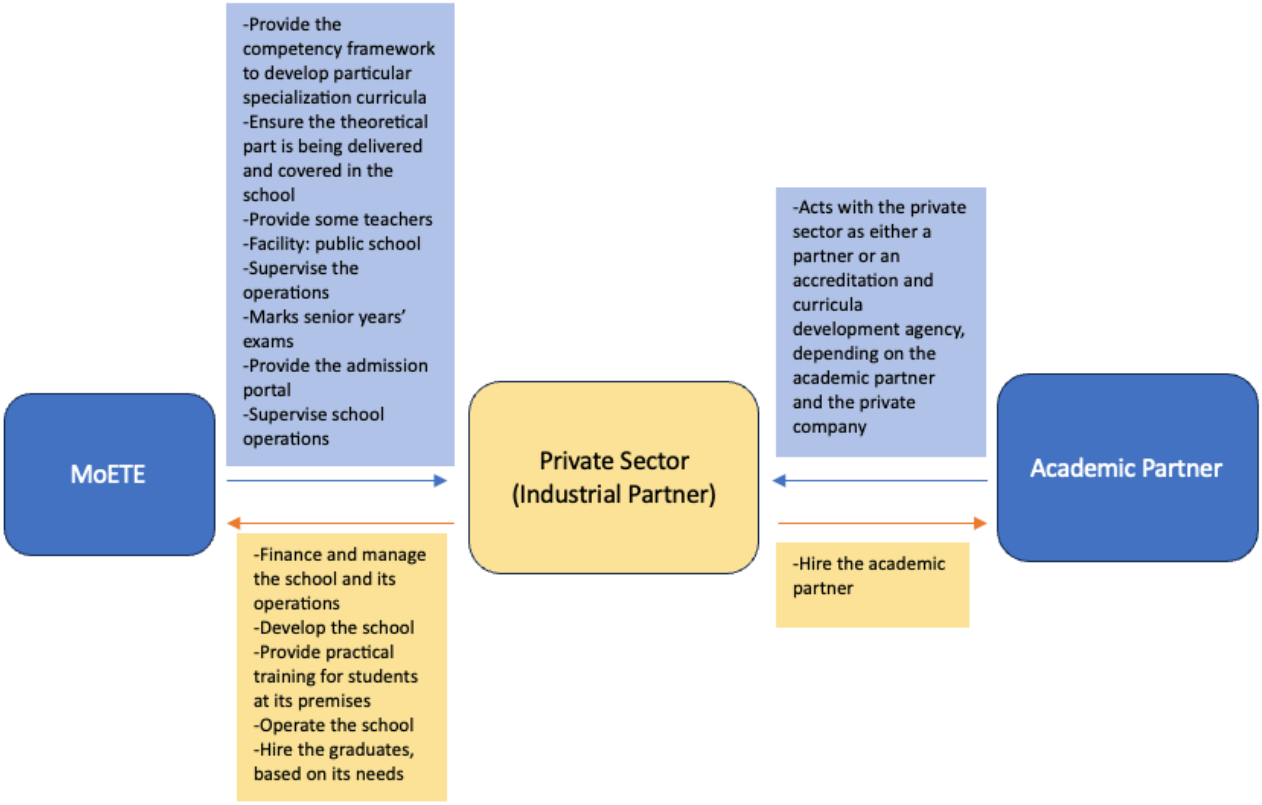
*In cases when the academic partner enters the agreement with the private company as a co-manager.
Source: Author

Source: Author based on interviews

6.2 Governing and coordinating the ATS PPP Model

The ATS internal school structure reflects part of the PPP model implementation. Outside this structure, the three main stakeholders: the MoETE, private sector (also referred to as the industrial partner), and the academic partner interact with one another to govern the system. Figure 6 illustrates the governance of the PPP model in the ATS system, explaining the relationship between each of the three.

Figure 4. PPP Model of the ATS, Relations within the three main stakeholders



Source: Author based on interviews

6.2.1 Private Company-Academic partner relationship

Management

The private company approaches the academic partner to either manage the school completely including accreditation (in the case of NASS academy) or provide only curricula development and accreditation (such as QDB) (NASS academy manager, August 2023). In some cases, the academic partner approaches the private company to invite it to launch a ATS school with its name, like what NASS academy did with WE Telecom ATS (ibid). It is important to note that in some cases, it is not the private company that approaches the academic partner but its foundation, where the company has/already had a foundation that acts as its social development arm such as Ghabbour Foundation, founded in 2017. In this case, the private company enters the model, where the foundation manages and acts like "the industrial partner" (private company director, October 2022).

The role of the academic partner differs based on the private company's desire of whether to have an academic partner that manages as well or to play this managerial role. In case of NASS academy, "a complete management" of the school entails operational management, academic and quality management systems are commissioned and in place (NASS academy manager[13], August 2023). This entails having a role in the selection of the students in the admission phase, conducting the admission tests, and establishing an employment center at the school once the school starts to have a graduate batch to match the graduates with potential jobs at companies in the sector. The academy also decides with the private company when and where the practical training will take place (ibid). In addition, in partnership with the private company, the academy participates in selecting teachers and hiring them. However, in schools where NASS is not an academic partner, teachers are hired by the industrial partner (NASS academy manager 2, August 2023).

WE Telecom has NASS as its academic partner, and thus, the academy manages the school in partnership with WE. Some other private businesses prefer running their own schools, where they have an academic partner, but the partner does not manage. Examples include Ghabour, Volkswagen, and B-TECH schools. In these cases, all the previously mentioned roles take place by the private company in partnership with the MoETE. This includes the selection of the incoming students, managing the admission process, and hiring teachers (NASS academy manager, August 2023). The MoETE does not oblige the private company to have an academic partner. Moreover, if/when the private company contracts an academic partner, the MoETE does not intervene in their relationship dynamics (ibid).

Curriculum development and accreditation

The private sector company decides the majors that will be provided at its school, based on its sector, its needs, and the market need in general (NASS academy manager 2, August 2023). The academic partner works on developing the curricula based on the competency framework

[13] Based on my interview with a manager at NASS academy, the "complete management" service provided by the academy was only provided in the market by NASS with no competitor until last year (2022), where other competitors started to offer the same service.

provided by MoETE. Based on my interview with a manager at NASS academy, the academy starts working on the curricula development to select which competencies from the competency's framework would better match the major being offered (NASS academy manager 2, August 2023). NASS works with the MoETE, the industrial partner, and the international accreditation agency in developing this tailored competency framework (ibid). Based on this framework, lessons and outcomes are developed, followed by the content development. The academic partner also works on getting the relevant accreditation for each major. Accreditation comes from international agencies.

When the private company sees there is a growing demand for a new specialization, and thus, they want to introduce it as a major in their schools, they first identify the specialization, and approach the MoETE for approval. This is according to Clause one in the signed agreement between the private company and the ministry (UNESCO, 2019, p. 37). Once approved by the ministry, the private company then contacts the academic partners to develop the curricula needed. In thinking throughout this process, the private sector thinks at least three years ahead, as the executive director of a private company mentions, "We always have to be at least three years ahead of the market because this is how long it takes to graduate a student" (private company director, October 2022). Once the academic partner develops the curricula, the industrial partner works "in both directions" – "accrediting this new curriculum according to the MoETE and its regulations so that it becomes an accredited specialization within the school", and on the other end, they also work with the German Chamber of Commerce "to also accredit it" (private company director, October 2022).

Student Certification

With this accreditation, the student can sit for the accrediting international agency's exam at their school without paying the exam fees as it is paid by the private company (school principal, July 2023). However, if the student fails during the first attempt, it is the student's responsibility to pay the exam fees for the second attempt (ibid). Thus, not all graduates receive the international accredited certification as most of them do not sit for the second attempt (student, April 2023). In addition to this certificate, the graduates receive another one from the MoETE and a third one

from the private company. The private company's certificate states the graduate's good behavior during all his years of study at ATS (ibid). Students who did not have proper conduct throughout their three years of study are not offered this certificate, and thus, they are not hired by the private company (student, April 2023).

Hiring ATS Graduates

If the private company has an accreditation academic partner, the hiring process is conducted by the private company only. In cases when the private company has an academic partner that co-manage the school, both the private company and the academic partner decide on the hiring and the matchmaking process of the school's graduates (NASS academy manager, August 2023). In the latter case, the academic partner can establish a career center at the school to help facilitate the matchmaking and the job placement. An example is the career center launched and operated by NASS academy at We Telecom school (NASS academy manager 2, August 2023). Nevertheless, in both cases, there is no particular process or structure that is applied across the different ATS schools. For instance, one of the schools have a career center established in the school that "help senior students before they graduate with their CVs, network with the big names in the industry, and organize career fairs" (private company director, October 2022). Other schools do not have such center.

It is important to note that not all ATS schools have graduate batches yet as most of them are still in their second or third year of operation since their launch. Thus, it is difficult to capture a comprehensive overview of the different processes. It is clear, however, that questions of who gets hired and how remain at the disposal of the private company. For instance, one of the schools do not hire students who did not receive the international accreditation certificate (private company director, October 2022). Another school, who had its first batch of graduates this year, did not hire those who scored less than 70% on their behavioral score throughout the three years (school principal, July 2023).

In addition, the process itself varies. The latter school, for instance, started the process of hiring those who do not need to study for this equivalent certificate once they graduate during the

summer (graduate, August 2023). These are also the top students in the school, whom the private company “guarantees” job placements according to their majors (graduate, August 2023). Those who are studying for their equivalent certificate will be offered a job upon their completion. According to a school principal, “we will wait for those who need to complete their equivalent certification and begin the hiring process once they finish” (school principal, July 2023). However, top students are given the priority to, first, be offered jobs in the company’s departments matching the majors they studied, and second, be placed at the company’s administrative headquarters (depending on the office’s needs). Other students can be offered jobs in departments that does not necessarily match the majors they studied (graduate, August 2023).

Moreover, it was noticed that the hiring process varies based on the major. For instance, one of the schools had graduates in sales, logistics, and retail marketing. The retail marketing graduates had a four-week orientation in the company, while the sales and logistics graduates did not. According to one of this batch’s graduates, “marketing is a strategic department in the company”, as its staff knows strategic information about the company that helps in developing their marketing strategies (graduate, August 2023). Accordingly, this orientation was only for those who will directly work in the department. Contractually, graduates are offered to choose between two types of contracts: full-time and part-time (graduate, August 2023). In case of full-time, students work five days a week and are given days off during their college exams timing throughout the year.

6.2.2 Private company-MoETE Relationship

The private company approaches the MoETE to sign the agreement protocol to launch an ATS school under its name. According to an interview with an academic school principal, the ministry did not have requirements from the private company except the following four points. Firstly, the classroom size remains caped at 25 students. Secondly, the specialization curricula have to be according to the competence framework and regulations developed by the ministry. It also has to be accredited by an international accreditation agency. Thirdly, there must be certain hours of practical training provided to the students per semester (school principal, July 2023). Fourthly, the private sector cannot use this agreement to make financial profits (UNESCO, 2019, p. 37).

The private sector's involvement is based on "their commitment to the corporate social responsibility" (ibid).

Private sector businesses can enter the agreement with the MoETE as one of the three options (ILO, 2021). The first option is for the private business can enter as "full partnership", where the private company signs itself the protocol with the ministry. This is usually followed by large companies with mega projects. The second option is a "consortium partnership", which is more suitable for medium-size businesses. The third and last option is "associate partnership" which allows small and micro enterprises to participate in the model; however, they only enter to participate in the apprenticeship programs provided within the ATS model, not as a full partner who manages the schools (ILO, 2021).

The agreement is signed between the MoETE and the Chairman of the private sector company or companies if it is a consortium partnership (UNESCO, 2019, p. 37). As the agreement/protocol is signed, MoETE offers the private company the facility, which is usually an old public school that needs renovations and enhancements. The private company starts the process of renovations and curricula development followed by accreditation by the relevant bodies in the MoETE and an international accreditation agency (as previously mentioned). Once the academic partner develops the curricula, the private sector "sits with the team in charge of the curricula development in the MoETE to ensure it meets the ministry's regulations, requirements, structure, the number of hours" (private company director, October 2022).

Generally, the MoETE plays a "supervisory" and "facilitatory" role with the private company (school principal, July 2023). According to a school principal, "The ministry is facilitating everything for us. They want us to go freely in the educational process" (ibid).

Admission, tuition fees, uniforms, and extra-curriculum activities

The admission of the students into an ATS school has been positively developing since its launch in 2018. It started with a google form that each school creates as an application for the students to apply directly to the school. The private company received the responses and contacted those

fit for a test and an interview to be conducted on the same day at the school. In AY20/21, this changed into a centralized system on the MoETE's website, where the student can apply for up to three ATS schools via one portal (student, April 2023).

The portal opens for applications for a certain period of time. Once the applications are closed, the student follows-up with the school of their first preference to know whether they are qualified for the next phase of the test and the interview. If qualified (whether to this school or their second/third preference), the student pays a non-refundable application fee of 250 EGP. The student takes the test at the school's premises (MoETE, n.d.a). After following up with the school and knowing whether qualified for the interview, the student attends the interview at the school's premises. The interview result can be one of the three: the student passed and are admitted to the school, rejected, or on the waiting list. The interview results can also be access on the MoETE's website through the same application portal (MoETE, n.d.a). In case the student did not qualify for the school of their first preference, the student ask the school that tested them for the transcript and provide it to the school of their second/third preference. If the student's score matches the minimum score set by the other school, they are qualified for the interview at this school (student, April 2023).

Despite the changes into a centralized system, the decision of the admission remains under the authority of the private company. The private company decides the academic score that it will accept, whether the student passed the test, and the interview. The MoETE portal simply helped in centralizing the system across schools, and thus, helped in the admission process management, where the decision-making remains to the private company.

Once admitted, students only pay 200 EGP per academic year as a contribution since the private sector finances students by waiving their tuition fees (school principal, July 2023). The private company pays for the students' uniforms and throughout the years, it also pays all fees related to the extra-curriculum activities at the school.

Company Training Programs

The MoETE requires the private company to offer practical training to its students during their years of study at the private company's premises. The training expenses are all covered by the private sector. Training must reach a minimum number of hours per semester set by the ministry, which according to a school principal, is an easy target as "the company needed students to train them, and so they started to provide training since year 1" (school principal, July 2023). If the private company desires, it can extend the training beyond the number of hours required by the MoETE per semester.

The timing of the training is decided by the private company. It is also the private company's decision to decide where to have the training; whether their administrative unit, ships, or stores, etc. (student, April 2023; school principal, July 2023). One of the schools assigns the students to the stores based on the geographical proximity of the store to the student's residency (school principal, July 2023).

Students during the training is supervised by teachers and administration, who go with the students to ensure their safety and their good performance. Students get grades based on their performance during the training each semester, which adds up to the total grade at the end of the year (school principal, July 2023). The private company has the option to provide summer training to its students, as one of the schools did based on the great performance of the students in their first training during the academic year. This training, however, does not contribute to the students' grades. It is part of the "students' development programs". In this training, students are paid a monthly stipend as a way of "encouragement", where it "boosts their self-confidence" that they are getting paid while still studying (ibid).

Hiring and firing teachers

Both the private company and the MoETE can hire teachers in an ATS school. If the private company has an academic partner, the academic partner can intervene in the teachers' selection process -depending on the agreement it has with the private company (school principal, July 2023). The MoETE hires teachers at an ATS school within the system of "*Intedab*", where the

teacher, who is already working at a public school, is hired to work at an ATS school for a specific period of time. If this teacher is fired from the ATS school, the teacher would go back to their former public school and continue teaching there (school principal, July 2023).

During the teacher's time at the ATS school, they get extra payment (almost double the salary given by the MoETE) by the private company as an incentive (ibid). The private company has the right as well to hire its own teachers. The process of hiring varies from one private company to another and is left to be decided by the private company with no intervention from the ministry. In cases of firing, the private company conducts investigation and its due diligence to validate students' complaints before firing. If validated, teachers hired by the private sector are immediately fired. However, if the teacher is hired by the MoETE, the school academic principal contacts the ministry to convey the complaints and requests that the teacher leaves the school.

Examinations

Cooperation between the MoETE and the private company varies based on the year. For students enrolled in years one and two, mid-year and final-year exams are corrected inside the school by the schoolteachers. However, the results are sent to the ministry to "revise and approve them", and then the results are published to the students (school principal, July 2023). However, for year three (senior students), exams are conducted under the supervision of the ministry, and the exam papers of both the mid-year and end of year exams are corrected outside the school by the ministry. Exam results are published by the ministry (ibid).

6.3 Categorizing the ATS PPP Model

Based on the previous mapping and understanding of the ATS PPT model, one can classify the model into both an *operational* and *educational* PPP, where the private company is involved in running the ATS (operational), and in renovating the school, training the students and the teachers, developing the learning material and accreditation (educational).

Table 4. Type of PPP Model in ATS

	Operational	**Educational**
Scope (focused/systemic)	Systemic	
Scale (experimental/policy-driven)	Policy-driven	
Method (take-over/complementary)	Take-over	Complementary
Motive (profit/social)	Social	

Source: Author

6.3.1 Scope

The private company is contracted to run the school for day-to-day operations, dealing with all stakeholders including teachers, accreditation agencies, and students. Moreover, the private sector manages the admission process. Accordingly, it is not a *focused* operational PPP with specific operational defined aims. While the MoETE has a supervisory role in the school management, the responsibility of the operations relies on the private company.

Similarly, educationally, the PPP model in the ATS schools is a *systemic* PPP, where the ATS model is one of the MoETE's reforms to the technical education sector. Moreover, the private company manages the exams, develops the curricula in the different specializations (with the academic partner), launch new majors at schools to meet the current and future anticipated labor market demand. The fact that it is a *systemic* PPP, and not *focused* for a certain defined aspect is also shown in the recent presidential decree to increase the target from 100 ATS schools to 400 schools in various governorates by 2030 (MoETE, 2023).

6.3.2 Scale

While the ATS schools started in 2018 as an *experimental operational and educational* PPP, with only three schools, with this growing expansion, and the future planned growth in the upcoming years, it has changed into a *policy-driven* PPP. This is also true as this expansion is also aiming at launching ATS schools in different governorates across the country (MoETE, 2023).

6.3.3 Method

The *operational* side of the PPP is *a take-over*, where the private company has full control of the operations of the school once the protocol is signed and the ministry offers the facility of one of its public schools. This does not negate the fact that the private company is supervised by the MoETE via the previously mentioned different channels. This *method of take-over operationally* is evident in the differences seen in the approach each private company manages the school and its training, which is what Travers (2003) describes happen with a *take-over*.

Nevertheless, *educationally*, the MoETE is heavily involved, as explained earlier, and thus, the ministry and the private company works together in a collaborative way, complementing one another to provide the best educational experience for the students. On the one side, the private sector adds the value of bringing in new specialization majors at their schools with internationally accredited curricula. On the other side, the ministry provides the general subjects. Similarly, with hiring the teachers, where the ministry would hire teachers for these subjects and the specialization subjects, if available, and the private company would hire teachers for its specialization courses (student, April 2023).

6.3.4 Motive

So far, *operationally and educationally*, the private companies have not sought after ways of bringing in activities that will generate them direct profits through the model. As mapped out in the first section, the private company does not have any profitable activity in the school. The private company benefits through having a highly qualified and trained graduate that knows the company's culture and can be hired immediately (school principal, July 2023). However, there is no profit-generation. In fact, it is stated in the agreement between the private company and the MoETE in the "Preface" that the private sector's involvement shall not seek to make financial profits (UNESCO, 2019, p. 37).

Yet, private companies are starting to think about the financial sustainability of this model on the long-term. In an interview with a school principal, she points out, "we are thinking of providing the same majors and curricula fully in English in an international school model as we are already

so good at what we do and provide and have proven ourselves in the market. Why not attract those students do. It would be useful also to be able to finance and sustain this current school" (school principal, July 2023).

To conclude, the PPP model applied in the ATS schools is a systemic, policy-driven, social *operational* and *educational* PPP. It is also an operational take-over, and an educational complementary model. It is important to note that this classification of the PPP model applied in the ATS schools is based on the current mapping of the ATS structure and system, which changed and might be changing over the years. Thus, classifying model will differ if/when future changes take place.

6.4 Policy and Operational Challenges and Opportunities in ATS

Within this type of PPP model, there are some identified challenges and opportunities that were mentioned by the different stakeholders during the interviews. Some of them are policy-based, while others are operational.

6.4.1 Challenges

6.4.1.1 Student Perspectives

- **Limited Higher Education Options after ATS Graduation: "I'm learning what they teach at Faculty of Commerce!"**

Students upon graduation from ATS schools are starting to face a challenge if they want to pursue higher education. The graduate has one of three options, each has its own challenge. The first option is to enroll in the available technological universities in Egypt, which were established in part to accommodate the ATS graduates and serves as a continuation of their "technological" learning (Ministry of Higher Education and Scientific Research, n.d.). However, these universities cannot be afforded by all parents or students (NASS academy manager 2, August 2023). The second option is to apply for "Al-Ahlia" technological universities, which has been recently established and thus, is still in the development phase of its system and curricula. These universities' curricula are not "as strong as what ATS students are being taught" (NASS academy manager 2, August 2023).

The third option would be to apply to public universities. Students *can* apply to public universities; however, there are only certain faculties and universities that ATS graduates can join based on the graduate's major at school (school principal, July 2023). Moreover, students face a similar problem to that of "Al-Ahlia" technological universities of the weak curricula compared to their ATS curricula. As one of the senior students point out, "I am learning what they teach at the Faculty of Commerce. We even learn it with more details compared to their curricula" (student, March 2023).

This challenge was also mentioned by a manager at NASS academy as a significant challenge that needs to be addressed. As he illustrates, "all the technological higher education universities so far do not provide a strong content compared to that of the ATS" (NASS academy manager 2, August 2023). This was confirmed in an interview with a school principal, where she pointed out that these universities do not have any curriculum related to the major provided at the school she manages (school principal, July 2023).

Thus, while this might indicate the high-quality of the education provided at ATS, it remains a challenge for its graduates to find the suitable higher education option. This might on the long-term jeopardizes the whole model as they will start to worry about the next step after graduation, which might negatively impact the demand on ATS, leading them to choose the general secondary system "Thanawayya-Amma" (ibid). As one of the students puts it, "we exert much more effort than other technical schools. Our curriculum is very difficult and demanding. I'm afraid that all this would go to waste. We should be treated differently than the traditional technical secondary schools. But what we found is that we are equated with them when we apply for university in terms of the procedures" (student, April 2023). A manager at NASS confirms this by saying, "we are already starting to see a decline in the applicants for ATS despite the fact that the number of ATS schools are increasing every year as people started to notice that the next step after ATS is unclear and vague" (NASS academy manager, August 2023).

- **During the training: challenges at the workplace for ATS graduates**

Students during their training at the private companies interact with the company's employees. While some employees would be welcoming to them, others are resistant as they form a direct risk for the employees for two reasons. Firstly, students are more knowledgeable about the subject matter than the employees, especially the old ones. They are also more aware of the company's policies, and culture. Secondly, it is well-known that some of those students will be hired by the company upon graduation.

This challenge was mentioned by two students and validated by the school principal, as she mentions, "we [school administration] are trying to keep them safe as much as we can" (school principal, July 2023). She adds, "employees see the risk in losing their jobs for those students once they graduate" (ibid).

6.4.1.2 PPP Model

- **The possibility of "one partner not needing the other" – "the MoETE guides us"**

The essence of PPP is the partnership between the private and public sector so that each sector complements what the other provides. "The greatest challenge that can happen right now is for one of these two sectors to think that they do not need the other party", according to a manager in NASS academy (NASS academy manager, August 2023). For example, the ministry partners with the private company to develop the units in the schools on the short term and on the long term, this development would enhance the quality standards of the wider technical education system. The system would collapse if the ministry believed it can run the school management without the private sector company (ibid).

This challenge was also pointed out by the executive director of one of the private companies that run an ATS, as she mentioned:

> "*We do not own the schools. We work with the government … the government is really keen on supporting ATS. There is a lot of trust and a lot of support from the government to the ATS schools in general. There is motivation and encouragement for the private sector to be part of the ATS schools. However, if ever there is a change in that kind of government direction or shift in focus, for instance, this will directly impact the*

offering that we have and the kind of flexibility that we have to introduce the development that we want to do" (private company director, October 2022)

While this exact statement can be seen as a challenge, it is also an opportunity for the PPP model to sustain if both parties remain aware of what the other party brings to the table, which seems to be the case – at least with the private companies. In addition to the previous quote from one of the private companies, a school principal representing another private company agrees on the significant presence of the MoETE as she states:

"The ministry guides us a lot. They saved us various trial and error. They minimized it as they are sharing with us their experience and they are asking us to take care about certain things, and criteria which was very helpful for us" (school principal, July 2023).

- **School's preference is based on the student's "first preference"**

One of the new raising challenges to the system is that given the new central admission system via the MoETE online portal, some schools are starting to select incoming students based on the student's ranking of the school in their list of preferences. If the student listed the school as their first preference, the school starts contacting him/her. It was mentioned that in some cases, these schools do not accept students who listed the school as second or third preference (student, April 2023). This does not give a chance for others who had it as a second or third preference, as they do not contact them for the test or the interview even if they fit the required academic score set by the school. This challenges the objectivity of the system, adding unjustified biases, which if continued, might jeopardize the whole model.

- **Current global economic crisis**

The current global economic crisis in addition to the outbreak of the pandemic has negatively affected some private companies. As the executive director of a private company that has an ATS school points out, "the current global crisis and how it is magnified locally puts constraints on the industry as it obviously impacts our funding ability and the potential donors' ability to support us and fund" (private company director, October 2022). In addition, this crisis would

also affect employment, as this crisis “directly impacts [their] demand for the recruitment for employment” (ibid).

6.4.2 Opportunities

6.4.2.1 Students’ Perspectives

- **“We do not need private lessons. They teach us everything”**

One of the great opportunities seen by the ATS students is that they do not need private tutoring compared to the general secondary students who rely on them. As one of the students mentioned, “we do not need private lessons. They teach us everything at school” (student, April 2023). She adds that, “even if someone wanted to, they cannot. They might in the general subjects but not in the specialization subjects. They would need to attend school and depend on the teacher of the subject” (ibid). This was also mentioned by other students during the interviews, where another student said, “one of the advantages of the system is that there is no private tutoring” (student, April 2023).

6.4.2.2 Private Partners’ Perspectives

- **The focus on “digital” technical education**

According to the executive director of one of the private companies that has an ATS, “the opportunity we see in this model is the digital aspect of it as the market need now is shifting towards having skillful labor that is technologically competent” (private company director, October 2022). She adds that in the company’s sector, “the new technologies are coming in with the electric vehicles and autonomous cars. This would require that the students have a different set of abilities, not just technical skills but also industry 4.0 skills. Skills that are related to critical thinking, innovation, problem-solving, and working in teams. The ability to cope with technology and learn new skills is critical for technicians in the future, especially automotive” (ibid).

- **“We are not in a school. We are family”**

Students and graduates have mentioned repeatedly how appreciative they are for the services the private company provides them for free. Some of them has mentioned that it has become their “dream” working at this company when they graduate. Moreover, some of them are already in direct contract with the company’s senior management as they conduct visits to the school and sometimes hold talks for the students. One of the graduates and two of the students expressed this with pride, mentioning how they can “WhatsApp” a certain senior manager in the company. One of these students said, in his own words, “we are not in a school. We are family. I do not feel it is a school and I am a student” (student, April 2023).

This can be considered as an opportunity to the private companies as they would have employees who are not only aware of the organizational culture of the company but also feel a sense of belonging and loyalty towards it. This saves the company time and resources that are usually spent in orienting new hires.

- **Great Return on Investment**

The private sector spends nearly 40,000-50,000 EGP for each student per year (student, April 2023). This investment in the students is already yielding its return, where the private sector is offering job opportunities to its top graduates, and in some cases, offers job opportunities to the whole graduating cohort (graduate, August 2023). The executive director of an industrial partner describes the model in her own words by stating that, “the whole idea of the model is for us to be able to place our students in matching job opportunities” (private company director, October 2022). Accordingly, the investment provides the company with the needed skillful labor without the need to invest in the students’ higher education.

This return on investment is also evident in the private companies’ future plans. In an interview with a school principal, she points out that “our next plans are to expand and launch more (private company’s name) ATS schools as well as adding new majors” (school principal, July 2023). In another interview with the executive director of an industrial partner, she mentions that they “have opportunities in Upper Egypt”, expanding and launching ATS schools there (private

company director, October 2022). Thus, expansion plans seem to be going towards the ATS, which indicates that the private sector is already seeing the results.

7 Conclusion and Policy Recommendations

7.1 Concluding Remarks

In 2018, the MoETE launched the ATS schools constituting the first Public-Private Partnership (PPP) model to be applied in technical secondary education in Egypt. The model aims at supplying the labor market with experienced skillful competent graduates in the demanded sectors in the Egyptian labor market, and according to international standards. The model started with three schools in AY18/19 and has reached now over thirty schools, with the vision to reach 420 schools by 2030. Within this context, the PPP model adopted in the ATS system remained unstudied, and accordingly the challenges and opportunities to the model was unexplored. This study aimed at mapping the PPP model implemented in ATS, answering questions about how it is governed, coordinate, and implemented, the public and private roles defined in the model. Moreover, the study also aimed at identifying key challenges and opportunities for the currently implemented model of PPP and recommending potential ways of enhancement, which would be useful given the vision of expanding the model in the country. By answering these questions, the study is the first to analyze the PPP model implemented in the ATS system, and thus, contributing to the existing literature gap in studying PPPs in education in Egypt, and the literature on technical education in Egypt.

To achieve these research objectives, the study relied on the Egyptian Ministry of Finance's definition of PPP, operationalizing it by mixing two ways of categorizing PPPs in the literature and developing a new way of categorizing PPPs, which was used in the study. Interviews were conducted with twelve people, with at least one from each identified stakeholder in the ATS ecosystem, except for the MoETE. This was mitigated through examining the MoETE's press releases. Data collected were analyzed qualitatively and cross-validated through participant triangulation. All participants' personal identifying information was kept confidential throughout the study as well as the names of the schools.

Through these interviews, the study comes with various findings. Firstly, regarding the structure of the PPP model, the main stakeholders are the MoETE, the private company, and an academic

partner who might have two completely different roles depending on the academic partner contracted. Within the MoETE, two units interacts with ATS schools. These are the central administration for the development of technical education and the ATS operation and management unit. The latter is in charge -with the private company – of the school operations. However, it plays more of a supervisory role than operational role. There is a QA unit within this unit, which monitors each ATS school closely to ensure everything is running as expected. The structure within each school's top management is having three managers; one is appointed for logistical matters (by the private company), another is appointed for operational purposes including the academic side – known as the 'academic principal' (by the private company), and a school principal appointed by the MoETE, whose role is "keeping an eye" on the school, ensuring classes are being taught according to plan, exams are taking place during the agreed timings, etc. The academic principal is responsible for following-up on problems inside the school.

Secondly, regarding the dynamics within the three stakeholders, the private company manages the school operations, which are supervised by the MoETE. Depending on the academic partner, it might be co-managing the school with the private sector as well as developing curricula and providing accreditation, or only providing the latter. With this international accreditation, students get two certificates: one from the MoETE, and the other from the accrediting entity. The international accreditation exam is paid for by the private company. The private company is also responsible for issuing the behavior certificate, which indicates each student's behavior throughout the study years.

While the MoETE provides a central digital portal for interested students to apply for all ATS schools, each private company not only gets to decide on the minimum academic score required, but also manages the admission procedures. Both the MoETE and the private company hire teachers. During the academic year, the private company is required by the MoETE to provide the students with a specific number of hours per semester. Exams for seniors only are corrected by the ministry, while years one and two are corrected by the schoolteachers. After graduation, the private company is expected to hire its graduates in the private company. This is done with

the academic partner in cases when it co-manages the school with the private company. Accordingly, the hiring requirements and procedures vary from one school to another.

Based on this mapping and applying the categorization of the PPPs developed by the author, this PPP model is a systemic, policy-driven, and social operational and educational PPP. It is, however, a take-over operational model and a complementary educational model when it comes to the *method* of the PPP. Challenges and opportunities facing this model include the limited higher education options for ATS graduates, and the possibility of one party (private or public) assuming that they do not need the other.

7.2 Policy Recommendations

Based on these challenges, the following recommendations were developed. This is in addition to some recommendations that the stakeholders provided during the interviews as well. Accordingly, it is based on the on-ground experience from each stakeholder's role in the ATS system. One common identified concern that was expressed in almost all interviews with the private companies and academic partners is the sustainability of the ATS model as a model/school system in Egypt. It is worth noting that it is still too early to assess the sustainability of students' skills acquisition. The first graduate batch of ATS schools is for only the first three ATS pilot schools (mentioned earlier) and have only been in the job market for two years. The last two recommendations have to do with the PPP model itself and ensuring it has stronger governance.

i. Policy-level recommendations

i.i. Expansion of PPP Model as a policy in technical education

The MoETE announced its plans to expand the ATS schools to reach 420 by 2030, as previously mentioned. This policy of expansion is highly recommended. More importantly, it is highly recommended to approach the future developments and reforms in technical education from a standpoint of expanding PPP models in the system. The ATS through the PPP model serves as a solution to have a demand-driven model, where the private company decides on the majors based on the needs and demand in their sector. One of the identified "failings" of the public sector

TVET programs is the fact that the programs are supply- rather than demand driven (Egypt Network for Integrated Development, 2010, p. 6). This results in a mismatch between these programs' graduates and the market needs, as the report illustrates, "there is a clear disconnect between the TVET system and industry, the major marketplace for the system's outputs" (Egypt Network for Integrated Development, 2010, p. 6).

In addition, El-Hamidi in her study in 2018 affirms this problem by highlighting the need for right incentives for the employers and for policies to ensure that technical jobs are being filled with technical school graduates. In addition, the study recommends a platform to facilitate a direct connection between employers and graduates. Both points are being achieved within the ATS model – at least are reflected in the essence of the system, where private companies have a direct connection with the students and hire its graduates.

Moreover, we are starting to see new specialization that are not available in the other technical secondary school systems. This ensures an adequate supplied labor into the job market. Metwali (1989) mentions in his study of technical education in Egypt back in 1989 the importance of getting the private sector involved in the technical education provision. He stresses that the weakest point in the system is the complete absence of interface between schools and firms. Illustrating his point, he poses the following question (in Arabic), "how can the aim of training students to become employable be achieved if employers have no saying in the curriculum content?" (Metwali, 1989 as cited in Antoninis, 2001, p. 9).

Al-Qusi (1986) highlights that this led to an over expansion of specializations that are as needed as others. As a result, graduates from these specializations were appointed to irrelevant positions (Al-Ghannam, 1985), which weakens the link between education and employment and defies the ultimate aim of technical education. Years later after the publication of these referred to studies, Egypt Network for Integrated Development in 2010 highlights the same point, where its policy brief recommends "the promotion of close inter-linkages between TVET providers and employers" as well as "an active involvement of employers via some form of incentive scheme", and "greater involvement of manufacturers in the provision of curriculum content, equipment and training" (Egypt Network for Integrated Development, 2010, p. 7).

i.ii. Evaluation plan for ATS by the MoETE:

It is highly recommended that the MoETE ensures there are evaluations for the ATS system as the schools expand to 420 schools by 2030. Evaluations are to be conducted by independent bodies to ensure neutrality and avoid any conflict of interest. It should also involve all relevant stakeholders. Questions that this evaluation is aiming to answer are whether the ATS model is meeting its objectives. Accordingly, in developing the evaluation plan, it is recommended to follow the *Realist Evaluation* - developed by Pawson & Tilley (1997), as it helps in evaluating PPP based on the contextually designed objectives. It also helps to understand why this particular implementation of the PPP model with its dynamics through the ATS system works or does not work in the particular context of Egypt.

Utilizing this, in evaluating the ATS, the following evaluation criteria are recommended to be included:

- Quality of education - this includes the quality of teachers.

ETQAAN would be an important stakeholder in getting information on the quality of education within the ATS system.

- Employability of the ATS graduates *within Egypt* across schools governorates, specializations, and private companies
- Employability of the ATS graduates *outside Egypt* across schools governorates, specializations, and private companies

This can also be measured across different times to measure the sustainability of the acquired skills in the job market and the extent to which one of the aims of the ATS is still achieved - which is, ensuring the specialization provided meets the current and future job market demands and needs locally and internationally.

In addition, it is recommended to calculate and/or release official publicly accessible statistical data classified by the type of the technical secondary school system. Right now, official released statistics is by the major (industrial, commercial, hospitality, and agricultural)[14]. This suggested

[14] Examples for this statistical classification include CAPMAS, 2023 (Egypt in Numbers- Education), and CAPMAS 2022 (the annual bulletin for pre-university education for the academic year 2021/2022).

classification would be useful in assessing the supply of each school system of technical workers, and thus, assessing the objectives of each.

i.iii. Paving the way for ATS graduates to widen their higher education options

As mentioned in the challenges section, the path after graduation from ATS remains unclear and is challenging the demand on the system. This becomes particularly significant as during the interviews, students expressed their worry about the possible higher education options after graduating from the ATS system. In addition, statistics shows that about 14% of technical secondary graduates in Egypt pursue higher education options (Mohamed et al., 2019). It is recommended that the government intervenes to provide a solution that can deliver a clear pathway for the ATS graduates in pursuing their higher education. The government with its relevant agencies and ministries is recommended and not the private sector because of three reasons.

Firstly, the private sector would provide initiatives that is costly for the students and for a very limited number of students compared to the number of ATS graduates that keep increasing each year with the opening of new schools. This challenge was mentioned in my interviews with NASS academy, a school principal, and an executive director of a private company managing an ATS school. Secondly, there will be no clear incentive for the private sector to co-finance or enter into PPP in a model that would replicate the ATS in higher education as the investment is already yielding its positive return, as previously mentioned in the opportunities.

Thirdly, and more importantly, the way the private companies are dealing with this indicates their approach to the challenge. As a school principal mentioned, “what we are able to do is offering full scholarships in any universities to our top graduates” (school principal, July 2023). Yet, this solution is not sustainable on the long-term, as it is highly dependable on the private company’s sole decision to fund its top graduates and cannot be mandated as part of the model. Accordingly, it is recommended that the government intervenes, whether by incentivizing the private sector to co-finance some of “Al-Ahlia” technological universities or providing certain number of national scholarships for top ATS school graduates.

ii. Implementation-level recommendations

ii.i. Within the ATS system, provide orientations to private sector employees prior to students' embedding

In order to avoid resistance from employees to the students during their training periods throughout their study years, it is highly recommended that an orientation is conducted for these employees. This orientation would communicate with the employees what to expect and what is expected from them.

ii.ii. Selection Policy for the private companies

Right now, there are no selection criteria or requirements by the MoETE on the size of the private company entering into the protocol to establish an ATS. In fact, as previously mentioned, the private company can enter solo into a full partnership, with another company or more through a consortium, or enter only to provide the training for the students as an associate partnership. While through conducting the interviews, the third type was never mentioned by any stakeholder, it is still available for small-scale businesses and start-ups.

It is highly recommended that the ministry requires that private company to be operating for a minimum number of years, on a large scale and in more than one governorate. This is to ensure the sustainability of the ATS model as it is highly dependent on the sustainability of the private company itself. In cases if the private company go bankrupt, this will lead to the closure of its ATS, which jeopardizes the whole model and raises questions and doubts about the whole model by the students' parents. It is also important to ensure that the private company has the capacity to train its students at its premises during the duration of their studies.

ii.iii. Establish policies for governing the PPP model

As explained earlier, the PPP model applied in the ATS system is fluid, allowing it to develop, change, and adapt over time. However, there is a need to establish a set of governing standards and regulations to avoid current and potential future problems. As Yates (2006) mentions, "a public-private partnership will always … require some form of governance" (p. 9). With the growing number of schools, there is a challenge that "each school operates differently",

according to a manager at NASS academy (NASS academy manager, August 2023). This concern happened in fact this academic year with some schools' preferring to select those applicants who list these schools' names as a first preference (as mentioned earlier in the challenges).

There should be a collective participatory approach inclusive of all stakeholders to discuss what these standards can be based on its high-end objectives. These standards should be then followed in each school, regardless of the private sector company, its sector, or the majors offered by the school. It is crucial that this happens while all stakeholders are present. "If one party decided to establish these standards without the other stakeholders, believing that it is the governing body, the end-goal for which the ATS model was created will be diluted one way or another", according to a manager at NASS academy (NASS academy manager, August 2023).

With the lack of common standards that would guarantee the sustainability of the ATS model, there is also a risk of the private companies' withdrawal from the partnerships. As the executive director from a private company mentions, there was a type of schools that her company partnered in with the Ministry of Trade and Industry in 2017-2019. However, her company "decided to phase out of those schools because they were no longer matching the kind of model that (they) wanted to run in terms of development" (private company director, October 2022).

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Appendix 1- TVET Programs in Egypt

Table 1. TVET Governmental Programs in Egypt, *according to the responsible governmental authority/ministry*

Responsible Ministry/Governmental Authority*	**Type of Technical/Vocational Training/Education**
Ministry of Health and Population (MoHP) and MoETE	Technical Secondary Nursing Schools
Ministry of Health and Population (MoHP)	Vocational Training Centers (VTC) for the health sector
Ministry of Trade and Industry (MoTI) – through hits Productivity and Vocational Training Department (PVTD)	Vocational Training Centers (VTC) – three-year program for vocational education
	Training Stations ("Ma7ata") – three-year program for vocational education
	Three-year vocational education implemented by PVTD in cooperation with private sector companies
	Continuous training – short- and long-term adult vocational training programs
	Training for teachers and trainers of vocational education and training programs
Education Development Fund (EDF) – established in 2004	Integrated Technical Education Cluster (ITEC) 2009/2010
	Vocational education program
	Vocational training programs for re-skilling and up-skilling adults
Ministry of Higher Education (MoHE)	Technical Colleges (TCs)
	Colleges of Technology and Education (CTE)
	Technological Universities (TU) – introduced in 2018
Ministry of Manpower	Short-term vocational training
	Vocational apprenticeship scheme
Ministry of Housing Utilities and Urban Communities	TOMOHAR: short-and long-term vocational training programs for building and construction sector

**Other ministries/authorities contributing to the TVET sector through provision of vocational training programs are the Ministry of Investment, Ministry of Agriculture, the General Authority for Agricultural Reclamation, Ministry of Petroleum, Ministry of Electricity and Power, Ministry of Transport, Suez Canal Authority, and Ministry of Local Development.*

Source: produced by the author based on ILO, 2021

Table 2. Private and Non-Governmental TVET programs in Egypt

Egyptian German Technical Academy	Siemen's technical vocational training center. It is located in Ain Sokhna and started its operations in 2019. Siemens partnered with the GIZ and is implementing this school in partnership with the PVTD at the Ministry of Trade and Industry. It offers training for engineers and technicians from all industries.
El Gouna Technical Nursing Institute	Sawiris Foundation for Social Development. It started in 2010 and operated under a cooperation framework with a nursing school in the US. It offers several programs such as wellness, and adult nursing practice.
German Hotel School El Gouna	It offers a 5-year technical education program and vocational training for the hotel industry. Program is implemented in compliance with the German guidelines, and students receive a certificate from the Chamber of Industry and Commerce (IHK) in Leipzig.
The Management and Technology Training Institute (MTTI)	By the Arab Contractors. It has the capacity to teach up to 2000 trainees per year.

Source: produced by the author based on ILO, 2021

Appendix 2 -ATS Schools National List

Table 1. List of some of the ATS Schools as of 2023 by Location, Majors, and Partners

#	School name	Location	Majors	Partners
1	El Araby for Applied Technology	Menoufia Governorate	Air Conditioning, Mechanics and Electricity	El Araby Group
2	Metwally El Shaarawy For Applied Technology	Cairo Governorate	Architectural furnishing, Air Conditioning, Architecture trading	Taalat Moustafa Group
3	Badr School for Applied Technology	Cairo Governorate	Mechatronics	Egytraf company
4	Ahmed Taalab School for Applied Technology	Cairo Governorate	Management and operation of restaurants	Americana Group and Misr El Kheir Foundation
5	I-Tech School for Applied Technology	Cairo Governorate	Information Technology	IBM and El Alfy Organization
6	Electro Misr School for Technology Applied	Cairo Governorate	Mechatronics	IECD, French Chamber of Commerce, Schneider
7	El Sewedy School for Applied Technology	Sharkia Governorate	Mechanics and Electricity	El Sewedy foundation for development
8	El Salheya for Applied Technology	Sharkia Governorate	Technology of animal and poultry production Agriculture and irrigation technology	El Salheya Company
9	Egypt Gold School for Applied Technology	Qalyubia Governorate	Jewelry Making	Egypt Gold
10	WE School for Applied Technology School	Cairo Governorate	Information and communication technology, computer technology, electrical systems	Telecom Egypt (WE)
11	B.TECH School for Applied Technology	Cairo Governorate	Retail Trade	B.TECH Company for Retail Trade
12	HST School for Applied Technology	Cairo Governorate	Monitoring and Alarm-Artificial Intelligence-Digital Games- Digital Arts	HST for Electronic Systems and Technologies
13	Riyada School for Applied Technology	Port-Saied Governorate	Milk Manufacturing	Riyada for Milk Products

14	Academy of Arts Applied Technology School	Giza Governorate	Technology of Lighting, Sound and Photography, Disguising and Masking, Puppets and Dummies, Musical Instruments, Garment and Show making for Artistic Shows and Stage Management	Academy of Arts
15	Ghabbour 1 School for Applied Technology School	Cairo Governorate	Maintenance and auto industry	Ghabbour Foundation
16	Ghabbour 2 School for Applied Technology	Giza Governorate	Maintenance and auto industry	Ghabbour Foundation
17	Volkswagen School for Applied Technology	Cairo Governorate	Car maintenance and repair	Volkswagen Group
18	Abdaa Applied Technology School	Cairo Governorate	Artificial Intelligence	Abda for Project Development
19	Abdaa Applied Technology School	Damietta Governorate	Logistics	Abda for Project Development
20	National Bank of Egypt and Food industry Applied Technology School	Giza Governorate	Mechanics and Electricity, Food safety, and quality assurance	National Bank of Egypt, Federation of Egyptian Industries, and Chamber of Food Industries.
21	Banque Misr Applied Technology School and Medicine industries	Giza Governorate	Medicine manufacture technology	Banque Misr, Chamber Industry of Cosmetics & Medical Supplies, and Federation of Egyptian Industries
22	Banque Misr Applied Technology School and wood and furniture industries	Giza Governorate	Furniture carpentry technology and Furniture finishing technology	Banque Misr, Chamber of Woodworking & furniture Industry, and Federation of Egyptian Industries
23	Banque Misr Applied Technology School and building materials industries	Beni Suef Governorate	Inspection and selection of marble blocks, General maintenance of washing lines, and maintenance of SPD	Banque Misr, Chamber of Building Materials Industries, and Federation of Egyptian Industries
24	National Bank of Egypt Applied Technology Schools	Cairo Governorate	Mechatronics, electrical, and ready-made cloting	National Bank of Egypt, Egyptian Chamber of Apparel & Home Textile

	for mechanical and electrical industries and ready-made clothing			Industries, Chamber of Engineering Industries, and Federation of Egyptian Industries
25	NTG Applied Technology School	Cairo Governorate	Programing, databases, project amangment	NTG Clarity Networks Inc.
26	BSL Applied Technology Schools	Cairo Governorate	Landscaping	Badr School for Landscaping, and Awan-Elward for Landscaping
27	Mahmod El-Anani Applied Technology School	Minya Governorate	Plant production, poultry production, agricultural engineering, and food manufacturing	Dakahlia Group, Al-Anani Foundation for Development, and National Charitable Investment Fund for Education known as Education is life
28	Nahr El-Kheir Applied Technology School	Minya Governorate	Agricultural engineering, lands and water, agricultural economy, Orchards, agricultural crops, and Animal production	Al-Ahly Group & Education is Life Fund
29	Misr School for Applied Biotechnology	Cairo Goverorate	Technology Technician; Bio-Industries, Pharmaceutical Industry and Registration Technician; Auxiliary Technician	MTBI Industries & Education is Life Fund
30	STEP Applied Technology School	Sohag Governorate	Artificial intelligence	STEP Upper Package compan
31	SIDPEC Applied Technology School	Alexandria Governorate	Petrochemicals	Sidpec: Sidi Kerir Petrochemicals Co.
32	Jeans Car Applied Technology School	Cairo Govenorate	Integrated industries for car, yacht and aircraft upholstery	Jeans Car

Source: Adopted by the author based on MoETE, 2020 & MoETE, 2023a

Appendix 3 – Interview Questions Guide

Opening question:

- Can you please share the story of how this school was established?

Operational side of the PPP Model:

- How is the school run in terms of the daily operations?
- Who admits the students into the school?
- Who hires the staff at the school?
- How do you help the students after their graduation?
- What do students do if they have a complaint about a teacher or anything else at the school?

Educational side of the PPP Model:

- Who developed the curriculum for the students? And how?
- Who decides on the training provided for the students?
- Tell me more about the exams system.

Concluding questions:

- From your point of view, what are the challenges and opportunities to the PPP model implemented in the ATS system?
- Based on your experience, do you have any recommendations to better enhance the system? If so, what are they?

Extra questions asked for students:

- How did you learn about your school?
- Tell me more about the application process, and your current learning experience.
- How do you see your career after graduating?

Extra questions asked for graduates:

- The private company is supposed to hire you upon graduation, did this happen? If so, how did it take place?
- What do you think about this hiring process?