Meta-ideas for Shanghai’s Future

 in Innovative Entrepreneurship

by

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**Abstract**

Shanghai is currently the largest city in China, not only in terms of population or metropolitan area, but more importantly by GDP as well. However, it wasn’t always the case. Only since 1991, Shanghai began its intense growth and within a couple of decades it transformed from a dull socialist city into a modern capitalist metropolis. The Chinese government strongly believes and supports Shanghai’s potential and set the goal of it becoming the world’s leading technology and innovation center by 2030. Based on our observations on the current performance of the city of Shanghai, we tend to believe that this goal is too optimistic. In this paper we analyze whether this goal is an attainable one and what are Shanghai’s prospects regarding long-term growth. Using Romer’s New Growth Theory we chose three categories – education, government and culture – that we analyzed and later recommend meta-ideas in regards to these categories. According to Romer, innovation is a key component for economic growth, thus we analyze the three areas we chose specifically in respect to innovation. The findings of our analysis helped us formulate a set of suggestions that would help Shanghai reach its goal and achieve sustainable long-term growth.

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**Introduction**

The city of Shanghai currently has an ambitious goal of becoming the global technology and innovation center by 2030. A recent survey conducted by KMPG states that in 2017 Shanghai was indeed selected by 26% of respondents as the city to be the next Silicon Valley, which is perceived to be currently the leading innovation hub in the world. With the 2030 target year quickly approaching, the Chinese government becomes more proactive in this regard and tries to take actions that would help the city achieve this rather zealous milestone. Shanghai is now offering subsidies to attract overseas talents and engineers; political advisors aim to push new policies to untap further the city’s huge potential in Big Data and artificial intelligence etc. These are all promising steps that will indeed eventually help the city develop, but to what extent will this development and growth go? Will these actions enable Shanghai to transform into the next Silicon Valley? Or are there intrinsic characteristics of the city’s system and culture that would always keep Shanghai one step behind? Having these questions as a starting point, the purpose of this thesis is to investigate whether what Shanghai is doing now is sustainable and whether Shanghai would manage to reach its objective only by mimicking the western success stories and hoping that it will be a good fit with the Chinese market and society.

Through research we hope to prove that only by replicating foreign ideas and models, Shanghai would never excel to the position of global leader in innovation and technology. It is crucial to clarify that in this research paper, we do not view entrepreneurs as people who simply run their own companies or are self-employed in small businesses. We use Joseph Schumpeter’s definition for entrepreneurs and innovators: “people who come up with ideas and embody those ideas in high-growth companies”. Through research we try to show that Shanghai needs more “innovative” entrepreneurs who upset and disorganize the existing way of doing things, rather than “replicative” ones who set up small business much like other small businesses. We suggest that a new entrepreneurship model is needed and it should be catered specifically to China, considering its differences from the rest of the world. By doing so, China will be able to grow the next generation of entrepreneurs that leverage their unique culture and flip their perceived weaknesses to strengths.

To test our thesis hypothesis, we will use Paul Romer’s New Growth Theory as the foundation. This theory shows that “economic growth doesn’t arise just from adding more labor to more capital, but from new and better ideas expressed as technological progress”. New Growth theory challenges the old model by stating that economic growth doesn’t arise only from exogenous forces, rather it is an endogenous outcome of an economic system.

The main difference between the endogenous and exogenous growth theories is that the new endogenous theory accounts for investment in human capital, innovation, technological advancement and knowledge as being significant contributors to the economic growth. Simply put, exogenous growth is based on economics of things, which are subject to decreasing returns due to the finite resources; endogenous growth, on the other side, is based on economics of ideas and knowledge, which lead to increasing returns because the more they are used, the more growth can be generated. From this comparison we can see that most economic growth actually has a very simple source: new ideas. However, while defining the source is easy, generating the new ideas might be more challenging.

In 2003, statistician David Banks wrote a paper called *The Problem of Excess Genius* where he addresses the topic of geniuses, or innovative people, being clustered in the same periods of time. Banks talks about examples from history and discusses the common arguments about peace and prosperity being the keys to this puzzle, and yet, he concludes the paper by saying that the phenomenon of genius remains a mystery. We cannot contribute to the explanation of the past events, but we believe that currently the phenomenon of excess of genius can be stipulated by knowledge spillovers.

One of the factors that affect endogenous growth is the knowledge spillover, both between different countries and on a cross-country level as well. Starting from the fact that all knowledge can be economic knowledge, the new knowledge spillover theory of entrepreneurship says that not individuals are the decision-making agents, but firms are now considered to be the decision-making unit of analysis. Therefore, in the new theory, knowledge production function is reversed because the agent decides to start a new firm based on expected net return from a new product. So far it can be observed that China has been highly benefitting from the “western” technological spillovers, however not that much on a cross-country level. Hence, the New Growth theory argues that investments in technology could lead to greater technological aptitude and, as a result, greater growth. In our case this would mean that China should be encouraging its own knowledge spillover, which would, first of all, boost up its own position, but also benefit the rest of the world in the end too.

To explain this theory in a more simplistic way, the metaphor of the kitchen can be used. When we cook, we use many different ingredients; we can think of these ingredients being the resources we have in an economy. By cooking the same recipe over and over again, there is a risk, and a high probability, that at some point we will run out of ingredients. Hence, we should try to find ways in which to use different combinations of ingredients – new recipes. By using this metaphor we can say that China is focusing on doing a lot of cooking, and indeed they are very good at doing it. From an operational perspective China is very efficient. Nonetheless the problem is that most of the cooking they are doing now is based on foreign recipes. Looking at the most successful Chinese brands we notice that Baidu is a copy of Google, Weibo is a Chinese Twitter, Alibaba is an Amazon wannabe etc. One might say that since they are still implementing new recipes, be they foreign or not, China is doing more cooking and hence it is on the right track. Yet, things are not that optimistic. The foreign recipes that China is “borrowing” have been created based on foreign economies and are continuously adjusted based on foreign needs. Hence none of them take into consideration the differences of the Chinese resources. A product that is centralized around the Chinese consumer from the very beginning is intrinsically different from a foreign product with Chinese adjustments. Therefore, what China should focus on is building its own unique recipes that would optimize the use of its ingredients, and maybe even become such good recipes that the rest of the world would want to use them too. These new and better ideas that we suggest that China needs, can be developed with the help of meta-ideas.

Normally advancement in any field presumes the creation of ideas. However, these ideas are generally focusing on the development of things, services etc. and there is not a certain process that would guarantee that someone will eventually come up with new ideas. Therefore, the difference between ideas and meta-ideas is that the latter focuses on giving some structure and encouragement to the creation of ideas. Simply put “meta-ideas are ideas about ideas”. How can we encourage the development of more ideas? How can we guarantee that these “more” ideas are good ones as well? Meta-ideas should be the ones helping us to answer the previous questions. They are the ideas that support both the production and the transmission of new ideas within an economy. To simply explain the concept of meta-ideas, think about brainstorming. For a long time brainstorming was just the process of coming up with new ideas. You either had them, or you didn’t. In the recent years though it has become more structured and now there are multiple techniques that are supposed to help you brainstorm like “googlestorming”, “ask an outsider”, “use sheets” etc. Similar to the brainstorming techniques, but taking this to a more general level, we can say that meta-ideas should provide us with some resources or techniques that would help people come up with new ideas constantly.

Although, according to the theory, there are a number of meta-ideas that should work in any economies, such as institutions, the market, the city etc., in this thesis paper we suggest a number of meta-ideas that we believe fit best the Chinese, and specifically Shanghainese, economy. The meta-ideas that we recommend evolve mainly around the following three categories:

1. **Education & Innovation**: We use education, and mainly the analysis of the educational systems in China as a starting point for building our meta-ideas recommendation. More specifically, we look into the accessibility of education; thus, to what extent do investments in individuals and scholarships occur. We analyze the discipline offerings in respect to their potential of encouraging the development of innovation. Lastly, we explore how the increasing number of international students and the launch of venture universities affect the dynamics of college level studies.
2. **Government & Innovation**: Within this category we analyze the regulations that the government implemented in the last couple of years in order to encourage innovation in the pursuit of the 2030 goal and the impact these regulations had. We do a comparison of the last two government’s five-year plans to see the changes in their strategies. Through this analysis we are able to spot whether the government has been focusing only on specific areas and whether it has been omitting important aspects that they could improve.
3. **Cultural Psychology & Innovation**: We present recent studies on the holistic way of thinking that explains how Easter Asians see things, analyze situations and react to control. We introduce what are believed to be the smart connected products and how the future is expected to be based on ecosystems of this kind of products. Later we examine how the holistic thought could have an implication on the creation of the smart connected products of the future.

We strongly believe that by bringing to life meta-ideas for these specific categories, Shanghai would have higher chances to become a sustainable innovation center that can compete on the global market. Chinese locals should be able to stay true to themselves and embrace their own culture, while creating products that would become strong competition to the western ones. Therefore, this thesis paper would provide useful and contra intuitive information for anyone interested in the development of the next leaders that can excel in Shanghai.

The paper will be organized in the following way: Section I will introduce the topic of education and innovation. We will show that the current Chinese educational system is not offering enough resources that would foster an innovative and entrepreneurial environment for the new generations. Section II will talk about the implication of government and innovation. We found that the government has been focusing for too long on the same industries, which has been holding back the development of new areas. Section II will discuss how Chinese culture impacts the development of innovation. In this section we state that Chinese nationals have different approaches to innovation and hence the 5-step creative process model cannot be applied the same way it is used in other parts of the world. In Section IV we will introduce our suggestions and recommendations that we believe Shanghai should follow. Lastly, In Section V we will conclude our research findings and talk about some other areas that could be interesting and useful for further research.

**Section I**

**Education & Innovation**

In order to successfully justify the need for meta-ideas related to Education & Innovation in supporting Shanghai’s ambitions, our aim is to further investigate the following three areas and how they impact the whole educational picture:

* Accessibility of education
* Supported disciplines
* Emergence of experimental projects within higher education

However, the abovementioned areas are not standalone concepts that would help us gain useful insights without putting them in the bigger context of Chinese education in general. Therefore, first of all we will introduce the current educational landscape in China.

**Educational Landscape in China**

Education in China is a system run by the Ministry of Education. The state enforces that each citizen should attend 9 years of compulsory education however, this law is implemented differently depending on the region that one lives in, be it a developed city, a town/village or some rural area. Although attending a high school is not mandatory, overall within the country senior high school attendance increased by more than 3 times in the last 20 years.

The elementary school is comprised by 9 compulsory courses, plus one additional foreign language elective, while secondary school has 13 compulsory courses. In order to gain access to a high school, students need to pass an examination called *zhongkao* 中考. Senior high schools are somewhat more flexible because they have multiple subject areas that a student can choose from, and besides the core requirements, such as Chinese, Math, History, Geography etc., they also offer the chance to enroll in a number of electives.

Despite the presence of electives in schools, education in China remains centralized with regards to curricula guidelines and major policy decisions. In order to be eligible to apply for a university, students need to pass the national examination called *gaokao* 高考. Gaokao is considered to be a very challenging examination that requires a lot of prior preparation. Depending on where a student is placed within the gaokao ranking, he/she has certain university options available, meaning that someone with an average score most likely will not be considered in one of the best institutions.

The most flexible high schools are the international ones both in terms of the courses offered and the final examination. Because the gaokao exam is not mandatory in international schools, students mainly take courses that would prepare them for applications to foreign universities. In most cases it is assumed that parents that enroll their kids in international schools plan to send them abroad in the future. The emergence of international schools in Shanghai especially is striking. There are currently over 35 international schools in the city and the number is growing, which could be taken as a sign of Chinese parents preferring a western style of education over the Chinese one.

**Accessibility of Education**

As mentioned in the previous section, the law about 9 years of compulsory education is implemented differently in different areas around the country. Hence, the opportunities offered to students can be described as limited because it would be considerably hard for someone from a less favorable area to enroll in a better school. Additionally, there has been done extensive research on hukou-based school segregation. Hukou is the system of household registration in China. Previous research shows that “rural migrant children in cities are even less likely to be enrolled in schools than children who are left behind by their migrant parents in the countryside, because of their lack of local hukou status and policy discrimination against migrants”(Xu 3). One way around this issue could be enrolling in international schools that have separate admission processes. However, international schools are generally very competitive to get in and, in addition, they have very high tuition fees that an average Chinese family would not be able to cover. Therefore, it is fair to say that at a school level, education in China is not equally accessible to everyone.

Moving to the higher education level, we have already covered the part about gaokao being one of the main admission criteria. Although we mentioned that gaokao is a challenging test, we believe that an intelligent student, who has a big potential of contributing to the economy later on, seeking to pursue a bachelor degree has fairly high chances of mastering the gaokao test. Taking the test score variable out of the picture, financing a higher education might be a problem some students might be facing. University tuition fees range anywhere between RMB10,000 to RMB80,000, with degrees in arts being the cheapest, and the ones in technology, medicine, business being the most expensive. Even though Chinese university tuition fees are considered to be low compared to other western universities, with an average yearly income of RMB67,000, it is reasonable to say that many families would not be able to afford their kid’s higher education on their own (besides tuition fees, we did not even include the living expenses in the calculations). To help families in such situations the government offers financial aid for outstanding students.

Besides making sure that talented Chinese students get a chance to attend universities, the government is also very supportive towards international students. There are multiple scholarship programs that aim to attract foreign talent, however, the pitfall here is the fact that foreign students graduating from Chinese universities face big challenges finding a job after graduation. The current immigration law prohibits foreign nationals from receiving a working permit unless the individual had two year of prior working experience, which of course recent graduates do not have. One way around this issue would be to get a job in a company listed in the Free Trade Zone however those jobs are limited as well. So as of now, although the Chinese government is making an effort into attracting talented foreign students and sponsoring their studies, they do not get much in return because the students take their acquired knowledge and go back abroad.

**Higher Education in Shanghai**

Although education in itself comprises more than the higher level, we strongly believe that for the purpose of our research topic, it will be more fruitful to look into the higher education landscape, since individuals with higher education are more likely to be able to provide substantial contributions.

While investigating the current situation in Shanghai, we have found that there are 36 universities in total (Appendix 1). Out of them, 9 are national universities, 20 are municipal universities, 6 are private universities, and 1 is Sino-foreign.

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Until September 2017, while looking at universities in Shanghai, and in China in general, it was very important to consider the following two governmental projects: Project 211 (211工程) and Project 985 (985工程). Table 1 below provides a brief description of each project and lists the Shanghainese universities that are part of each project. Receiving a degree from one of the universities that belonged to one of the projects was considered very prestigious and often big Chinese corporations would set rules that would prevent HR departments from hiring candidates with diplomas from other institutions.

**Table 1.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Description** | **Universities from Shanghai listed** | **Double First Class** |
| **Project 211** | * Initiated in 1995
* Goal: raising the research standards of high-level universities and cultivating strategies for socio-economic development
* 116 institutions in total
 | Fudan University | Yes |
| Tongji University | Yes |
| Shanghai Jiao Tong University | Yes |
| East China University of Science and Technology | No |
| Donghua University | No |
| East China Normal University | No |
| Shanghai International Studies University | No |
| Shanghai University of Finance and Economics | No |
| **Project 985** | * Initiated in 1998
* Goal: increasing the development speed and gaining more reputation for China’s universities
* 39 institutions in total
 | Fudan University | Yes |
| Tongji University | Yes |
| Shanghai Jiao Tong University | Yes |
| East China Normal University | Yes |

In September 2017, a new program called Double First Class University Plan[[1]](#footnote-1)(双一流) replaced both Project 211 and 985. This new program includes a total of 42 first class universities (Class A – 36, Class B – 6), and 465[[2]](#footnote-2) first class disciplines that are being taught in 140 different universities. The Ministry of Education (MOE), the Ministry of Finance (MOF) and the National Development and Reform Commission (NDRC) intend to implement necessary measures in order to reach the target in three steps:

1. By 2020: to develop a number of world-class universities and a group of world class disciplines
2. By 2030: to have more universities and disciplines among the best in the world; to have significant improvement in China’s overall higher education strength
3. By 2050: China to become a higher education power

In terms of universities that are part of the new plan, there are no considerable changes for Shanghai because the same four universities that were part of the latest 985 project, are now part of the Double First Class Plan as well. Thus, to analyze the changes that this new program might bring, we take a closer look at the disciplines that the government highlights. First we compiled a list (Appendix 2) of the project disciplines taught in all the universities and have noticed that 100 of them are taught in less then ten universities, and only 9 are taught in 10-29 universities. It is important to mention that 5 of the key “popular” disciplines are in one way or another connected to engineering, and the other ones are chemistry, biology, mathematics, and computer science. The other disciplines that are taught in less than 10 universities are spread over multiple areas of study from pharmacology to politics.

For the purpose of this thesis paper, we want to see how are universities encouraging the development of innovation and creativity, however, from the list of disciplines we observe that most of the disciplines are science related and are focused on the production side. This means that the government supports and wants to ameliorate the production processes, or making specific products more efficient, but it is not necessarily motivating the students to achieve a more innovative way of thinking that, be more creative with their products, and initiate start-ups. Every year Shanghai ends up with thousands of new graduates who are ready to go into research and development departments, but who unfortunately not aware of how entrepreneurship works.

Although the big universities who are part of the Double First Plan are technically the ones most supported by the government and hence the ones that authorities have bigger expectations from, it is fair to say that other universities in Shanghai are also quite big and have big potential of educating highly qualified professionals who could contribute to the economy. Therefore, our next step was to take a closer look at all the other universities in Shanghai. After the first screening we realized that there is a big number of universities with areas of specialization in art, music, sport etc. Our immediate next step was to filter out the universities that are specialized in areas other then business, technology or innovation. Hence, we selected 11 universities for which we gathered data regarding the departments or the majors offered, depending on availability (Appendix 3).

Analyzing the data regarding the departments and majors[[3]](#footnote-3), we found that most of the universities have similar departments and majors and are offering general introductory courses in business administration, or finance, or accounting etc., but only a few of them go further into making available entrepreneurship courses or programs that students could be part of. Further we will mention the few cases about a couple of universities that have entrepreneurship related resources available for its students.

Fudan University is one of the few universities that does offer its students access to some programs that would help them build their entrepreneurial skills and realign their business models in order to achieve sustainable development. To be more specific, they offer the “High Potential Entrepreneurial Programme” and an Entrepreneurship Bootcamp, however both this programs are only a couple of weeks long and both of them are in partnership with Hong Kong Polytechnic University. The information regarding these programs is only available on the PolyU platform, which tells us that Fudan University itself is not very involved in the promotion of these specific programs.

What Fudan University does do at a local level, is that they have *Fudan University Student Entrepreneurship Center* which “provides student entrepreneurs who win the scholarship with office space, office equipment, personnel management, secretarial services, entrepreneurial guidance and consultation, as well as assisting the startups with various paperwork, related finance and preferential tax policies, and providing the student entrepreneurs with professional guidance and assistance” [[4]](#footnote-4). Shanghai Technology Entrepreneurship Foundation sponsors this center. This foundation offers seed funding that does not exceed CNY100,000, as well as follow-up support and services to eligible Chinese graduates. Needless to say that this program is very competitive and funding is limited.

In addition to the entrepreneurship programs and center, Fudan University also works closely with Shanghai’s “four centers” [[5]](#footnote-5). The university has currently a strategy of serving the city of Shanghai and hence uses school resources “to broaden the fields of cooperation with local and business organizations, and more rapidly building and spreading industry-university research institutes; focusing on core technologies and key fields, and promoting technology transfer with the support of industrialization forums and platforms for information on industrialization”. Therefore, students are actively involved in entrepreneurial activities in collaboration with the technology and innovation centers and aim to make direct contributions to Shanghai’s economic and social development.

Another university that takes steps towards a more innovative future is Tongji University. In January 2017 Tongji University College of Design and Innovation (Tongji D&I) has opened the Shanghai Institute of Design and Innovation (SIDI).SIDI will focus on mainly three areas: transportation design, design driven entrepreneurship, and TMT. The dean of Tongji D&I believes that “SIDI will not only support developing state-of-the-art design education and research in Shanghai, but also get the technologies, innovations and creativities from university to market, enabling paradigm shift of economic and social development” [[6]](#footnote-6).. Design is one of the key disciplines in the Double First Class University plan, and Tongji is one of the only three universities where it is taught (only one in Shanghai), which means that Tongji, and SIDI especially, will take the leading role of the design education in Shanghai.

The last case that we would like to mention is the School of Entrepreneurship and Management at ShanghaiTech University. This school offers minors in Innovation & Entrepreneurship and Finance. Also, students from other majors can take electives in three broad areas:

1. Economics, business and entrepreneurship

2. Creativity and Innovation

3. Corporate innovation, technology and the future

NYU Shanghai professor Elliott Gattegno was the one to first build the curriculum for this school. During an interview that we conducted with him, he shared that while building the basics for this school, he had to take into account all the things that are normally present at western universities, but were absent at ShanghaiTech University. He mentioned that first “it was necessary to teach students how to have class discussions and how to critically dissect a case, all these sort of fundamental skills that are absent in a traditional Chinese university”. We will talk in more detail about the cultural differences that need to be taken into account in Section III.

The cases that we have mentioned above are the only entrepreneurship and innovation related resources that we have found in Shanghai, besides some minor instances where one single entrepreneurship course was taught within a major like for example “Entrepreneurial Venture Financial” at Donghua University. Summing everything up, it is clear that for a city where there are almost one million university students, the resources are very limited; students are not taught the fundamentals of entrepreneurship at an early stage and the universities themselves are not very flexible in terms of change. Some might say that this problem could be easily solved if traditional universities would become more like the western ones, or at least like NYU Shanghai, since it’s offering already a range of innovative courses and its Project and Creativity and Innovation (PCI) is such a success in Shanghai already. However, even with enough time, there will always be resistance from the government in terms of disciplines taught and the teaching styles used. All universities in Shanghai are thoroughly monitored by authorities, therefore unless the government perspectives’ change, there will be no radical changes within the Chinese educational system. But this doesn’t mean that the current educational system could not be improved at all. In Section IV we will share some suggestions regarding an educational system that should leverage the existing Chinese strengths, without the need of mimicking western ways.

**Section II**

**Government & Innovation**

The government plays a crucial way in setting the direction in which a country’s economy is moving. This is especially true in China where authorities take very active roles in the development of the economy. Every five years the Chinese government shares its plans for the future in a very thorough article where they talk in a lot detail about their concerns and areas of focus. The last plan was issued in 2015. Going through the previous five-year plans, it is easy to follow the dynamics of the economy and the shift in the government’s priorities.

The noticeable difference between the 12th Five-Year Plan (2010-2015) [[7]](#footnote-7) and the 13th Five-Year Plan (2016-2020) [[8]](#footnote-8) lies within the general aspects of the Chinese economy around which each plan mainly evolves. The 12th Five-Year Plan is heavily focused on elevating China’s competitiveness in manufacturing industries, encouraging the development of service industry, balancing rural and urban development etc. The country was looking to build fundamentals for long-term growth, however the overall picture gives the impression that it was hoping to achieve it through strengthening of existing competitive industries and by developing a couple of new ones. Now, what is important to look at is the way in which innovation is involved in this process.

In the 12th Five Year Plan, Chinese government successfully pins down the obstacles that the country is facing, and innovation, as expected, is a key element that they recognize to be weak. Along with such “incompatible and non-sustainable elements” within China’s development like “a tightened constraint between economic growth on one hand and resources and environment on the other, an imbalance between investment and consumption, a relatively large income disparity, unreasonable industrial structure, vulnerable agricultural basis, a gap between rural and urban development, a coexistence of total employment pressure and structural contradiction”, the concern regarding China’s innovative power is embedded within the “uncompetitive technological innovation ability” element. Yet, going back to their main goal of increasing competitiveness, it does seem like they intended to achieve this boost in competitiveness by involving innovation in their core industries, but it is not the innovation that creates something new for the economy, it is rather the type of innovation that just perfects the existing elements.

The 13th Five-Year Plan, in which although the government admits that its fundamentals for long-term growth have not changed, acknowledges “the need has become more pressing to improve the quality and efficiency of growth and transform and upgrade the economy”. Before (2010-2015), science and education were the first go-tos of the authorities in search of growth; now (2016-2020), they pursue an innovation-driven development where science and technology are more deeply embedded in the economy. The difference in weights innovation holds in the 12th and 13th plan is striking. While innovation gets occasionally mentioned in the former, it is present in almost each section in the latter. Therefore, it is fair to state that China did change its outlook on growth and how it can be achieved.

**Policy Implications**

There have been a number of policy implications in the last couple of years that have impacted the innovative environment in China as a whole, and therefore in Shanghai. In this section we will introduce a few of them that we believe are the most important ones.

The first step the Chinese government decided was important to take was aggressively increasing the input to innovation. According to the five-year plans, R&D has increased to 2.1% in 2015 and is on track to reaching its target of 2.5% by 2020. There are significantly more PhD graduates and the government is offering a number of programs that support talented professionals and attract eminent professors.

Although a lot of effort has been put into the input side, the output has not been responding with the same pace. Number of patents can be considered one way of quantifying the efficiency of R&D expenditure. If we look at number of patent application in China, the number is reaching almost two millions per year. However, this does not mean that China has been more innovative than Japan and Korea for example. China’s State Intellectual Property Office (SIPO) has a goal of promoting innovation within the country and consequently offers a lot of incentives and patent-friendly governmental policies that boost this number. One way of getting rid of this effect is to look at one of the global technology markets, such as U.S. Patent and Trade Office (USPTO) for example. From 2010-2015, the number of China-origin patents granted by USPTO reaches only 2.2%, compared to Japan’s 18.8%.

While trying to figure out what is the main cause of the discrepancy between input and output, we found the following key problems, which we will further discuss in details:

1. No R&D in basic research
2. Great Firewall
3. Cultural influence in funding allocation
4. New Tax programs
5. Intellectual property disadvantage for foreigners

One of the most important problems that cause the slowdown of output is the fact that China does not spend enough of R&D in basic research. "We should keep promoting entrepreneurship and innovation, and give full play to the initiative and creativity of the public. R&D outcomes should be put to full use so that we can better draw on the wisdom of the public," said Premier Li Keqiang. However, it is not enough to just invest in any R&D. Basic research consists only of 4% of total R&D in China, compared to an average of 14% in other economies[[9]](#footnote-9). This means that China is still focused too much on adjusting foreign discoveries to make them work in the Chinese market. This brings us back to Romer’s kitchen metaphor that once again proves that China is using foreign recipes, instead of spending money on coming up with their own.

 Not only does China focus too much on foreign innovations, but also the “innovations” that they are customizing for the Chinese market might not always be the most up-to-date ones. Because of the Great Firewall, Chinese researchers do not have access to all the scholarly publications available abroad. There is a version of Google Scholars in China, called Baidu Scholars, but that platform makes available mainly Chinese publications as well. Hence, the knowledge spillover that we mentioned in the introduction and said that is necessary for China, it is basically not possible considering the current conditions available. China cannot be on track with new innovation if it doesn’t know exactly what the latest updates were. Although, the use of VPN has dramatically increased in the past years, the government doesn’t cease to respond to the demand for VPN apps, and as of April 2018 VPN will most likely be illegal. VPN apps have been deleted from the Chinese App Store already.

Another root of this lag in output can be explained partially by the implication of government and cultural differences. Although China offers more research funding every year, the requirements for the funding become stricter every year as well. Bureaucrats appoint the committees that formulate the guidelines for funding offering. Because hierarchy is of paramount importance in the Chinese culture, consequently, the committees try to mainly please the bureaucrats. In the end, the final decisions are made based on nepotism or networking, and not on merit. Some people even say that at times the guidelines and requirements are so narrow that it is obvious that only some specific applicants will be able to meet them. It seems like everyone in the research industry is aware of this, but there is not much can be done at individual level to go against the bureaucrats (Science Magazine)[[10]](#footnote-10).

The fact that networking affects so significantly the distribution of funding drags down innovation from two perspectives. First of all, researchers have to spend way more time on building their connections instead of using that time on doing actual research, or attending, for example, seminars that would boost up their qualifications. Secondly, because bureaucrats normally have their positions for long periods of time, every year China ends up with the same “favorite” scientists who get the funding. This could mean that every year money is invested in research in the same industries or fields, because researchers are normally specialized in specific domains, rather then expanding to new ones and thus encouraging new innovative findings.

Lastly, we would like to touch on the topic of tax policies. In the last 5 years, China has been making many adjustments to its tax policies and many of them have been bringing good news to big and small enterprises. For example, in 2017 they announced that small enterprises with taxable income under RMB500,000 (previously RMB300,000) can benefit from preferential income tax (CIT) treatment; bonus deduction for some SMEs will increase from 50% to 75% etc. These are all certainly big steps towards supporting enterprises that work in the technology related industries. Among all the recent tax policies, we would like to focus on the new tax incentive programs that are designed to attract more foreign investment to China.

 In 2015 China announced its “Made in China” program and with that followed many attempts to make friendlier the tax programs available “to encourage the development of new knowledge, products, and processes among domestic and foreign enterprises alike”. Table 2 below briefly introduces each one of the current programs that companies can apply for. From the table we can see that all the programs are indeed generous. However, it is important to highlight that each of the tax programs has very specific requirements, for example, more than 35% of income from offshore, income from “technologically advanced services” has to account for more than 50%, companies have to be located in one of the 11 specified cities. All these requirements narrow down a lot the spectrum of potential companies who would be able to benefit from these programs. So far, ATSE is relatively the most accessible one because its requirements are more lenient than the ones for HNTE, while offering the same reduced income tax. HNTE on the other side has very high requirements. Startup companies for example would not be able to apply for HNTE because they do not have sufficient research and development (R&D) expenses or ownership of intellectual properties yet.

**Table 2. Tax Incentives**

|  |  |
| --- | --- |
| **Name of tax incentive** | **Description** |
| ***Advanced Technology Service Enterprise (ATSE) Status*** | Qualified enterprises with eligible business scopes – such as IT, industrial design, or supporting services for the film industry – which are located in designated pilot cities can benefit from:1. A reduced Corporate Income Tax of 15% (standard rate 25%)
2. Employee education expenditure incurred by a qualified ATSE, up to 8 percent of its total salaries and wages, may be deducted for corporate income tax purpose; while the portion exceeding 8 percent may be carried forward for corporate income tax deduction in future years.
 |
| ***R&D Super Deduction*** | Companies in traditional and new industries can benefit from:1. 150% tax deduction on eligible R&D expenses incurred during the year
2. Amortization of capitalized intangible assets developed through R&D based on 150% of their total value
 |
| ***High and New Technology Enterprise*** | Qualified companies in government supported sectors can benefit from:1. A reduced Corporate Income Tax of 15% (standard rate 25%)
 |

 While the effort of trying to offer “an opportunity for innovation-driven foreign companies to generate savings and value” is an admirable and appreciated one, often these opportunity is “foregone due to a lack of understanding of available programs, their requirements, and how to meet them”. Since China is trying to “open up” and both host and work with foreign companies, it is crucial to make the inclusion of these companies as smooth and encouraging as possible. When there is a chain of six different bureaus that you have to go through first before knowing whether you qualify or not for a specific tax program, some foreign companies might think it is not worth the effort. The design of the programs is not the only problem connected to this.

 China is known for limiting the access to many industries for foreigners, and only making them available through joint ventures. For example, the automobile industry has a rule of 50-50 foreign to Chinese joint company composition ratio. It has been a huge problem for leading manufacturers, because they do not want to share their innovation knowledge with local Chinese manufactures. A recent case was related to the car industry. One of the most frustrated foreign CEOs is Elon Musk who has been trying to set a plant in China multiple times already but was not able to due to the joint venture regulation that is not possible to avoid. Critics say that, by setting this rule, the Chinese government is trying to give a chance to the local brands to learn from their western counterparts, so that later on the local ones would be able to exceed the foreign ones. It is also of no news that intellectual property cases in court result most of the time with the Chinese parties on the winning side. This serves as a huge red light for foreign companies who would like to start operating and doing research in China. If the chances are high that they would lose in court their IPR for a specific innovation, they would rather prefer to stay away, no matter how high a potential tax deduction could get. On April 10th of the current year, president Xi announced that China’s economy will keep opening up through “reducing caps and removing barriers” and that serious action will be taken towards securing the IPR. One of the first actions of Xi’s agenda is to lower import tariffs for cars (The Telegraph). Are cars the only ones that need a lower tariff though? The specific car industry case backfired after a sour comment made by president Trump; the Chinese authorities should take this kind of initiative on their own, instead of reacting to foreign authorities’ criticism or suggestions.

With all of these said, we can certainly say that Chinese authorities are not just standing by and expecting development to happen on its own. They are actively involved and take many steps every year that they think would bring them closer to their goal of enhancing innovation in China. Another question remains, whether the steps that they take are efficient enough. We have seen that some of the actions they take, like the investment in R&D or tax policies, are not resulting in fruitful outcomes as intended. Other steps, like the decrease of import tariffs for cars are not timely enough. This leads us to the conclusion that the Chinese government still has a long way to go before they will have a perfect set of policies that would truly incentivize a considerable boost in innovation.

**Section III**

**Cultural Psychology & Innovation**

When we look at innovation in China from the top down perspective, it looks like China does have most of the key necessary components: it does not lack entrepreneurs, even though they are mostly engineers, there is a high market demand, and there is also an enormous wealth and will coming from the Chinese government to set new economic policies. Nonetheless, when we look from the bottom up, we see that there is an even more important factor that is shaping and constraining the entrepreneurial creativity. This factor is culture.

With an ancient history of over 4,000 years, China has vast set of values that guide the society. And although some principles like Confucianism, for example, with its strong emphasis on respect for education, authority and age, are not as rigidly followed anymore, they continue to underpin many customs and business practices. Exactly these kinds of values cause the fact that innovation in China does not work and is not perceived the same way as in other countries.

It is a world known fact that China once had the most innovative civilization. Papermaking technology, printing, compass, gunpowder etc. were all invented in China. So why is China now not as innovative as before? The short answer is that “during long periods in Chinese history, Chinese have been ruled, trained, and forced not to be different than what the layers of rulers, the teachers, and the parents wanted.” There has been extensive research done in the area of history of innovation in China, how dynasties were encouraging or discouraging innovation, how the philosophical principles were influencing the emergence of entrepreneurs etc. And all the researchers agree that, while innovation has a specific set of necessary conditions required for its successful development, China has a few bad conditions that do not match with those requirements. For example, innovation needs creativity; in China creativity was repressed since the first Chinese empire in 221 BC, and ever since the hierarchy is setting boundaries for individuals because you need to respect those “above” you, and not try to surpass them. This same hierarchy also limits competition, another condition for innovation. Chinese people are indeed competitive, but free competition was never allowed, instead organized competition emerged for the same sake of harmonious hierarchy (Someren 31). These are only some examples that prior research has found. One of the concerns that might arise is that all these culture related facts concern China as a whole, and some might argue that since Shanghai is such an international city, things might be different here. Unfortunately, we have not found any evidence that would confirm or deny this fact, and analyzing specifically this topic would take another whole thesis paper. Therefore, we decided to instead take one step back from the cultural values, and look at how this pre-existing conditions and values have defined the way Chinese people think now. It is important to highlight that we are not analyzing opinions or what Chinese people think, factors that might be influenced by location per se, but we focus on how they do it.

**Holistic Thought**

Many researchers talk about the fact that Chinese individuals have a different way of looking at a problem: they have a spiral type of logic – more roundabout and subtle, they are “we” oriented etc. However, Nisbett is the first one who formalized it and proved that Chinese people use holistic thoughts, compared to westerners who normally have analytical thoughts.

Richard Nisbett, from University of Michigan, has been dedicated to the topic of culture and thought for over ten years. His research findings are especially valuable for our thesis because he and his colleagues managed to prove experimentally how exactly Chinese people approach a problem. Hence, first we will briefly explain what holistic thought is, then we will introduce their findings that are related to our thesis and lastly we will explain why we think holistic thought is a big advantage that the Chinese society has.

Holistic thought is formally defined as “involving an orientation to the context or field as a whole, including attention to relationships between a focal object and the field, and a preference for explaining and predicting events on the basis of such relationships” (Nisbett 6). Hence, we can say that Chinese people are directed more toward the field as a whole and how objects are connected in one field, while westerners focus only on the focal object itself. Although this theory involves complex psychological analysis, it can be simply explained using one example: in one experiment students were given a card with a fish in a pond and have been asked later to describe what they saw on the card. While both American and East Asian students mentioned the focal fish, East Asians “made 70% more statements about background aspects of the environment, and 100% more statements about the relations involving inanimate objects from the environment”(12).

Besides the fact that Chinese pay more attention to the field as a whole, when they are asked to explain events, both physical and social, they usually do so with respect to context as situations. On the contrary Americans explain events with respect to a target object and its priorities. Therefore, Americans are the ones who are prone to the fundamental attribution error[[11]](#footnote-11), and Chinese are not. Additionally, another big implication found was the one of control. It has been proven that control actually impaired the calibration of the Chinese, their performance worsened and their confidence decreased as well.

We believe that each one of these findings is of a paramount importance for the Chinese society and government when they build new policies or make adjustments to current systems. Moreover, the holistic thought gives Chinese people a big advantage against any other westerners when it comes to innovation, because the future of innovation is in smart connected products and this kind of products can be created easier if you have a holistic way of thinking.

**Smart Connected Products**

For anyone living in Shanghai, it comes as no surprise the fact that people don’t carry wallets around anymore because they pay through a QR code, they don’t have to buy a bike because they can scan a QR code that lets them easily rent one. And while there are separate apps that do each one of the above-mentioned things, most importantly there is one app that allows you to do all those and a lot more. The app we are talking about is Alipay. Alipay is a smart connected product.

Smart connected products have “three components: physical components, ‘smart’ components, and connectivity component”(Porter, Heppelmann 5). With the Internet of things defining a new kind of future, researchers believe that the emergence of smart connected products is inevitable and welcomed for a number of reasons, be that efficiency or competition. But there is one key attribute that smart connected products have, that we think is the most valuable one: the ability to build new capabilities.

To understand why the creation of new capabilities is so crucial, we go back to the Disruptive Innovation theory. The theory of Disruptive Innovation, initially introduced in 1995 by Clayton Christensen, is relevant now more than ever considering the pace with which technology advances. New entrants cannot attract investors anymore based solely on their profitability. Everyone is racing for growth, and investors want to hear the growth prospects of the firms as well. As a result, startups have to focus heavily on building future capabilities.

To better comprehend the urgency of creating new capabilities, we can compare the pharmaceutical industry, with the car industry. Back in the day, to enter the pharmaceutical industry you mainly needed to know chemistry; later the industry started to involve cellular biology in the process too, and now it is focusing on bioengineering meaning that the pharmaceutical industry has been progressively changing in terms of the knowledge needed in order to excel in the industry. On contrast, the car industry was very “flat” until recently when electric cars have been introduced. Now that the knowledge about electric cars is out there, anyone, even car industry outsiders, could take advantage of this knowledge and try to replicate it. That’s why, the car industry incumbents have to proactively look for knowledge as the new source of innovation otherwise new entrants will invade the market. This example shows that it is not good enough anymore for a company to have the expertise in one area, because their competitive advantage could quickly diminish. Hence, all firms should be continuously trying to build new capabilities that would not be easy to copy. The next question that logically follows is: who can create these new capabilities that are so needed? Smart connected products can.

The convenient thing about smart connected products is that their intelligence and connectivity enable an “entirely new set of product functions and capabilities grouped in: monitoring, control, optimization, and autonomy”(Porter, Heppelmann 6). The trick about these four groups is fact that they build on each other and could ultimately enable the product itself to function with complete autonomy. These features will not only start reshaping industry structures but also redefining economic growth.

Going back to Romer’s New Growth theory, we think that knowledge will start gaining a lot more wait in the economic growth. Once everyone realizes that they need to go back to knowledge and use it as a new way of innovation, the market requirements will heavily shift towards potential capabilities building and growth prospect. That is why it was extremely important to analyze these new kind of products while trying to give recommendations on how Shanghai can attain not only growth, but more importantly build a “system” that would enable the continuous achievement of long and sustainable growth.

An another important takeaway that we need to highlight, is that smart connected products work in systems, some call them ecosystems and therefore the future lies in ecosystems of ecosystems of ecosystems, depending on how complex a product gets. A simple example of how ecosystems emerge is the tractor example given by Michael Porter and James Heppelmann. First there was a simple tractor which was doing one task; then its technical abilities were enhanced; later the same tractor could be connected to a computer for example and collect some data; consequently the tractor could collect data that could be used by the same farmer but for other task like planting or harvesting or others; in the end the tractor will be part not only of a farm equipment system, but a weather system or an irrigation system as well etc.

So far we have shown why we think smart connected products will have such a big impact on the way everyone sees economic growth, and now we want to show what can happen if Chinese people would set a goal to build more smart connected products. While there are already a couple of smart connected products in Shanghai, like Alipay or Wechat for example, it is hard to define whether the existing ones are singular “coincidental” cases, or if indeed innovation in Shanghai got to the point where there is a strong foundation for encouraging and promoting smart connected products. To answer this question, we go back to the holistic thought. As shown by Nisbett, Chinese people focus on the field as a whole and therefore they are at big advantage when they work with ecosystems of products. For them it is easier to see the whole picture in respect to the relations between elements and as result it would be much easier as well to operate with smart products too. And while we can not claim with certainty what was the reason behind the invention of the currently existing smart connected products, we think that in the future, Chinese people will be able to capitalize on their thought processes and could be a couple of steps ahead in the global race for innovation of smart connected products.

**Section IV**

**Recommendations**

After a thorough research of education, government and culture, we were able to depict some areas that we believe could use improvement. Hence, we would like to propose a set of recommendations that in our opinion would facilitate the development and enhancement of innovation in Shanghai. Of course, we cannot say that these recommendations guarantee that Shanghai will certainly become the world’s innovation center; but we argue that by having a strong foundation at the basis of each meta-idea, Shanghai will enable a constant flow of new ideas. And that was our end goal from the beginning: to find a way to create an environment where the creation of new ideas is encouraged and supported. Some of these ideas might fail, however, only through trial and error the city will keep advancing on the innovative scale.

*1. Grow new generations of entrepreneurs*

To be closer to its prosperous innovative future, Shanghai has to grow a new generation of entrepreneurs. Education is the first key factor that needs to be improved because it forms the future generation and it shapes the way they perceive innovation processes from early stages. Our research has shown that there are not enough resources that young students can use. One suggestion could be that all universities should offer at least introductory courses about entrepreneurship, innovation and/or creativity. But, unfortunately, we do realize that most of the universities in Shanghai are traditional ones that have been here for many years and have specific methods and values that they are enforcing for very long periods of time already. Changing the curricula of these universities would be a very idealistic solution, or at least one that would take a very long time to successfully implement. Therefore, a more reasonable approach would be to focus on extracurricular resources. By making sure that each student has a platform that he/she can use, at least outside the classroom, for their personal development and for the formation of a specific set of skills, Shanghai will create an environment where each individual knows that such resources exist, and moreover, are available to them as well. Such resources could include business incubators in each, or groups of universities, partnerships with tech centers that already operate in Shanghai. Simply put, each university should be doing more of the stuff that Fudan University is doing in terms of its offerings.

1. *Implement new teaching methods catered for Chinese students*

Although we did say that it might be too challenging changing the curricula of universities, we want to insist on the adjustment of the teaching methods used in China in universities as well as schools, even though these adjustments might come at a high cost too. We have seen that Shanghai is trying to move towards a more western teaching style, through the opening of many international schools and starting to rely on sino-joint universities like NYU Shanghai and affiliating local traditional public schools with this kind of universities[[12]](#footnote-12). Aspiring for a western education is exactly the opposite direction from where Shanghai should be heading. In Section III we have shown that Chinese people have considerable different ways of thinking from the westerners, which means that they approach things differently too. This differential sensitivity of Chinese and Western individuals has implications in many domains, education included. For instance, teachers may want to emphasize different things when dealing with Chinese students than when dealing with Americans, for example, since the focus of attention of the two groups is different. Chinese students may need more help in “differentiation and analysis of focal objects, whereas American students may need more help in seeing relationships between objects, including the self and the field”(Nisbett, 26). Another example is the constant emphasis on leadership and initiative in the western system. Because it has been shown that control has direct effects on the performance and confidence of the Chinese, it might be a better idea to pursue a more often use of team projects where each member has equal contribution. By starting to capitalize on this differences in thought processes, the next generation might grow to be more confident and might find it easier tackling focal objects because their teachers and professors will have a better understanding of what their strengths and weaknesses are.

*3. Support the integration of international graduates in the local job market*

So far, we have focused on the education of Chinese students, however international students have a big contribution to the Shanghainese education as well. We have shown that the government does try to attract foreign talent through scholarships, first at a university level, and then for young professionals as well. Nonetheless, it is unreasonable that China is first investing in the growth of this talented people, and then lets them leave because they do not satisfy the requirements[[13]](#footnote-13) for working permits for example. The first step in solving this problem, should be the adjustment of the current policies that should allow international students who have obtained their degrees in China to work in any[[14]](#footnote-14) companies in Shanghai, because all the companies, regarding of where they are listed, are contributing to the economy.

*4. Build a fair funding system*

After making sure that all talented graduates, Chinese and international, are able to excel further in Shanghai, the next step is to build a fair funding system that would enable all these young professionals to be equally exposed to government funding. In Section II we have seen that sometimes bureaucracy is playing a way bigger role in the funding allocation process then it should have. The new system should be a fair, transparent and easy accessible one where there would be funding offerings for different kind of applicants, from different industries as well. Our analysis has shown that the Chinese government has a tendency to focus on a couple of industries that they are pro-actively promoting because they are the successful ones that support the economy. However, they should abandon or at least deviate from that approach and try to support more industries that could potentially become as successful as the currently leading ones.

*5. Revise regulations and requirements for foreign companies*

After the government will make sure that all the industries have equal potential of growing and becoming more innovative, authorities should also revise their “opening up” strategies regarding integration and collaboration with foreign companies. We have seen in Section II that the current requirements for foreign entrants can be very harsh, like in the case of the car industry, and often favor only the Chinese counterparts. If the Chinese government indeed in this way is trying to give a chance to the local companies to learn from the foreign ones, China should be offering more appealing terms and insuring that IPR are heavily protected. China should be a fair player and focus on the development of its own innovations. Unfortunately, although we didn’t involve much the political issues in this paper, we have to admit that policies that concern not only Chinese players, but foreign ones too, are often subject to political games and their timing and focus often depends on these games as well. But, regardless of how the political situation looks like, there should be established and integrated digital business registry that would shorten and easy the process of registration for foreign companies, and that should also include user friendly tabs that would clarify what can the company benefit from or what its obligations are, like the eligibility for some tax programs that we have previously talked about for example.

*6. Adjust organizational structure and culture considering the holistic thought*

Lastly, change should happen within organizational cultures as well. By deeply analyzing and understanding the Chinese thought process, company leaders should realize what methods are efficient with Chinese workers and which ones are not. There shouldn’t be such a strict hierarchical organizational structure if research shows that those in control don’t perform their best due to the pressure or if consequently there will be less free competition. We would suggest relying heavier on team projects instead. Also, models like the 5-step creative process one[[15]](#footnote-15), for example, should not be used anymore if it will be proven that they focus too much on one product and don’t let Chinese people freely navigate through the relations between the product and the environment. As we have mentioned in Section III, many people believe that the future will be based on smart connected products. If Chinese people are the ones who, due to their thought process specificity, are better equipped for that future, everyone from government to individuals should abandon the westernization race and start working and using their own strengths.

 If all the recommendations above will be followed, Shanghai will enjoy the evolvement of young people who have been taught how to better use their abilities, who know where to go to in case if they want to implement some ideas, and as a result they will be motivated to come up with more new ideas. In terms of the business environment, there will be a fair competition between researchers first of all because they will aim to develop more appealing research plans in the race for R&D. Additionally there will be a healthy competition between local and foreign companies when no one can rely on “external” contributions. And finally, people will be feeling more comfortable and confident at their works spaces because their bosses will approach them in ways that would boost their willingness to contribute and belief in better performance. All these conditions, would not necessarily guarantee, but would at least bring Shanghai closer to its goal of being lead by innovation.

**Section V**

**Conclusion**

Going back to the initial goal Shanghai has of becoming the technology and innovation leader by 2030, if we ask ourselves whether it can reach it or not, we do not have a yes or no answer; it depends. With the way things are right at this moment, Shanghai has chances of becoming more innovative, but probably not the most innovative city in the world. If everything that the government has promised to do in the last couple of years, and in the 13th Five-Year Plan especially, will be implemented, chances are getting bigger. However, judging by the history, it is more likely that some things will be omitted, as there have been cases in the past. Also, by observing how lately the government has been extending their deadline for making Shanghai the global innovation center from 2020 to 2030, we can assume that authorities themselves do not hold strong belief in its achievement. Therefore, changes are needed. This is definitely not a lost case scenario because Shanghai does have big potential. Hence, we believe that our recommendations, which are based on specific pitfalls that we have found during our research, could highly contribute to this issue. A successful completion of our recommendations would at least guarantee a more entrepreneurship friendly environment, and at most would accelerate the innovative progress in Shanghai and would help Shanghai achieve a long and sustainable growth.

We do acknowledge that there are limitations to what this specific thesis paper has covered. First of all, we did try to focus on the city of Shanghai as much as possible; still, there were instances, like the analysis of governmental policies when we had to look at China as a whole. Therefore, further research could be done to define what are the differences and similarities between Shanghai and other innovative cities in China, like Shenzhen for example. Another issue that we briefly mentioned before is politics. Although we try to stay apolitical in our research, it is important to admit that in real life economies are indeed influenced by politics too. These implications could serve as topic for another research paper. Moreover, we identified holistic thought as one of the specificities of the Chinese people, but there might be many more that we did not include in our analysis but that could also contribute to it. Overall, we believe that we managed to get answers to our questions and were able to achieve the results that we initially set.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Appendix 1.** |  |  |
|  | **Name** | **Type** | **Comments** |
| 1. | Fudan University | National  | “High Potential Entrepreneurial Programme” partnering with HK Polytechnic University |
| 2. | Tongji University | National  | Shanghai Institute of Design and Innovation (SIDI) opened in 2017. Focuses on: 1. Transportation design 2. Design driven entrepreneurship 3. TMT |
| 3. | Shanghai Jiao Tong University | National  |  |
| 4. | East China University of Science and Technology | National  |  |
| 5. | Donghua University | National  | Within school of business, the bachelor in finance has the “Entrepreneurial Venture Financial” course required |
| 6. | East China Normal University | National |  |
| 7. | Shanghai International Studies University | National |  |
| 8. | Shanghai University of Finance and Economics | National  |  |
| 9. | Shanghai Customs College | National  |  |
| 10. | University of Shanghai for Science and Technology | Municipal |  |
| 11. | Shanghai Maritime University | Municipal |  |
| 12. | Shanghai Institute of Technology | Municipal |  |
| 13. | Shanghai University of Medicine & Health Sciences | Municipal |  |
| 14. | Shanghai Ocean University | Municipal |  |
| 15. | Shanghai University of Traditional Chinese Medicine | Municipal |  |
| 16. | Shanghai Normal University | Municipal |  |
| 17. | Shanghai University of International Business and Economics | Municipal |  |
| 18. | East China University of Political Science and Law | Municipal |  |
| 19. | Shanghai University of Sport | Municipal |  |
| 20. | Shanghai Conservatory of Music | Municipal |  |
| 21. | Shanghai Theatre Academy | Municipal |  |
| 22. | Shanghai University | Municipal |  |
| 23. | Shanghai University of Engineering Science | Municipal |  |
| 24. | Shanghai Lixin University of Accounting and Finance | Municipal |  |
| 25. | Shanghai Dianji University | Municipal |  |
| 26. | Shanghai University of Political Science and Law | Municipal |  |
| 27. | Shanghai Second Polytechnic University | Municipal |  |
| 28. | Shanghai Business School | Municipal |  |
| 29. | ShanghaiTech University | Municipal | School of Entrepreneurship and Management offers minors in Innovation & Entrepreneurship and Finance. Electives in three broad areas: 1. Economics, business and entrepreneurship 2. Creativity and Innovation3. Corporate innovation, technology and the future |
| 30. | Sanda University | Private |  |
| 31. | Shanghai Jian Qiao University | Private |  |
| 32. | Xing Wei College | Private |  |
| 33. | Shanghai Institute of Visual Arts | Private |  |
| 34. | Xianda College of Economics and Humanities | Private |  |
| 35. | Tianhua College, Shanghai Normal University | Private |  |
| 36. | New York University Shanghai | Sino-foreign |  |

A1

Appendix 2.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of the Discipline** | **Number of Universities** | **Name of the Discipline** | **Number of Universities** |
| Materials Science and Engineering | 29 | Geophysics | 3 |
| Chemistry | 24 | Integration of Chinese and Western Medicine | 3 |
| Mathematics | 18 | Landscape Architecture | 3 |
| Biology | 16 | Library & Information and Archives Management | 3 |
| Computer Science and Technology | 14 | Linguistics | 3 |
| Control Science and Engineering | 13 | Metallurgical Engineering | 3 |
| Mechanical Engineering | 11 | Modern Linguistics | 3 |
| Chemical Engineering and Technology | 10 | Music and Dance | 3 |
| Environmental Science and Engineering | 10 | Petroleum and Natural Gas Engineering | 3 |
| Ecology | 9 | Power Engineering and Engineering Thermo physics | 3 |
| Clinical Medicine | 8 | Psychology | 3 |
| Information and Communication Engineering | 8 | Safety Science and Engineering | 3 |
| Mining Engineering | 8 | Surveying and Mapping Science and Technology | 3 |
| Pharmacology | 8 | Systems Science | 3 |
| Physics | 8 | Traditional Chinese Medicine | 3 |
| Traditional Chinese Pharmacology | 8 | Veterinary Medicine | 3 |
| Basic Medicine | 7 | Agronomy | 2 |
| Civil Engineering | 7 | Astronomy | 2 |
| Electrical Engineering | 7 | Aviation and Aerospace Science and Technology | 2 |
| Mechanics | 7 | Business and Management | 2 |
| Applied Economics | 6 | Education | 2 |
| Chinese Language and Literature | 6 | Engineering | 2 |
| Geology | 6 | Ethnology | 2 |
| Politics | 6 | Fine Arts | 2 |
| Statistics | 6 | Forestry Engineering | 2 |
| Crop Science | 5 | History of Science and Technology | 2 |
| Drama and Film | 5 | Horticulture | 2 |
| Electronic Science and Technology | 5 | Instrument Science and Technology | 2 |
| Foreign Language and Literature | 5 | Journalism and Communication | 2 |
| Law | 5 | Marine Science | 2 |
| Management Science and Engineering | 5 | Naval Architecture and Ocean Engineering | 2 |
| Software Engineering | 5 | Nuclear Science and Technology | 2 |
| Archeology | 4 | Nursing | 2 |
| Armament Science and Technology | 4 | Public Health and Preventive Medicine | 2 |
| Biomedical Engineering | 4 | Public Management | 2 |
| Chinese History | 4 | Sports | 2 |
| Forestry | 4 | Textile Science and Engineering | 2 |
| Geography | 4 | Theoretical Economics | 2 |
| Geological Resources and Geological Engineering | 4 | Urban and Rural Planning | 2 |
| Marxist Theory | 4 | Water Conservancy | 2 |
| Philosophy | 4 | Accounting and Finance | 1 |
| Plant Protection | 4 | Aquatic Products | 1 |
| Stomatology | 4 | Art and Design | 1 |
| Traffic and Transportation Engineering | 4 | Art Theory | 1 |
| World History | 4 | Artistic Theory | 1 |
| Agricultural Engineering | 3 | Economics and Econometrics | 1 |
| Agricultural Resources and Environment | 3 | Foreign Language and Literature | 1 |
| Agriculture and Forestry Economic Management | 3 | Light Industry Technology and Engineering | 1 |
| Agrostology | 3 | Machinery & Aerospace and Manufacturing  | 1 |
| Animal Husbandry | 3 | Optical Engineering | 1 |
| Architecture | 3 | Public Security Science | 1 |
| Atmospheric Science | 3 | Social Policy and Management | 1 |
| Business Administration | 3 | Sociology | 1 |
| Design | 3 | Statistics and Operational Research | 1 |
| Food Science and Engineering | 3 |   |   |

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1. “Thirteenth Five Year Plan for Education”

http://www.gov.cn/xinwen/2017-01/27/content\_5163903.htm#2 [↑](#footnote-ref-1)
2. Some disciplines are taught in multiple universities and are double counted. Overall, we found 109 unique disciplines. [↑](#footnote-ref-2)
3. Data regarding the whole list of courses offered was available for a couple of universities and was taken into consideration. [↑](#footnote-ref-3)
4. www.fudan.edu.cn [↑](#footnote-ref-4)
5. www.cumulusassociation.org [↑](#footnote-ref-5)
6. Zhangjiang Hi-tech Center, Yangpu National Innovation Pilot Zone, Shanghai Technology Innovation Center [↑](#footnote-ref-6)
7. *The 12th Five-Year Plan for Economic and Social Development of The People’s Republic of China (2016–2020)*. Compilation and Translation Bureau, Central Committee of the Communist Party of China. [↑](#footnote-ref-7)
8. *The 13th Five-Year Plan for Economic and Social Development of The People’s Republic of China (2016–2020)*. Compilation and Translation Bureau, Central Committee of the Communist Party of China. [↑](#footnote-ref-8)
9. Data from www.data.oecd.org [↑](#footnote-ref-9)
10. Yigong Shi and Yi Rao for *Science* *Magazine* [↑](#footnote-ref-10)
11. Tendency to attribute behavior to dispositions of the person and to slight the role of situations and context (Ross, 1977). [↑](#footnote-ref-11)
12. Yangjing High School has been affiliated with NYU Shanghai in April 2018. [↑](#footnote-ref-12)
13. Mandatory 2 years of prior working experience. [↑](#footnote-ref-13)
14. Currently international graduates can work only in companies listed in the Free Trade zone. [↑](#footnote-ref-14)
15. Preparation, incubation, illumination, evaluation, implementation [↑](#footnote-ref-15)