mKETs-PL working document

Country report China

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Content

1. Policy perspective

1.1. *Country specific innovation system with emphasis on KET*

Since more than 30 years the Chinese innovation system is now in the process of transformation from a Soviet-style centralized planning system towards a market-oriented macro-managed and competitive structure which is able to encounter the challenges of the globalization age. At the beginning of the Chinese reform era in the 1980s the social role of science and technology was newly defined: thereafter, politics focused on technological modernization in order to serve the national economic growth. As a consequence, the improved linkages between the scientific and the industrial sector became an issue even before the concept of innovation system has gained the importance it has nowadays in China. Many institutional changes occurred, new stakeholders were established and funding programs served the overall goal of national development.
At the same time several traditional features from a planning economy also remained in the Chinese innovation system, first of all the dominating role of the Chinese government in relation with the often monopolistic state –owned enterprises (SOE).

The most important institutional and political stakeholder in the Chinese innovation system, is the State Council as the highest decision-making body. Below the State Council, the National Leading Group of National Science and Education (国家科技教育领导小组) forms the trans-institutional steering body in the public research sector. The group is chaired by the Chinese prime minister. Its members are the highest representatives of the relevant state institutions of Chinese science and education sector (e.g. Ministry of Science and Technology MOST, Ministry of Education MOE) and those of the interface areas within the whole innovation system, especially the National Development and Reform Commission (NDRC 国家发展和改革委员会). Figure 1 gives a good overview of the Chinese National Innovation System, its main stakeholders and functions.

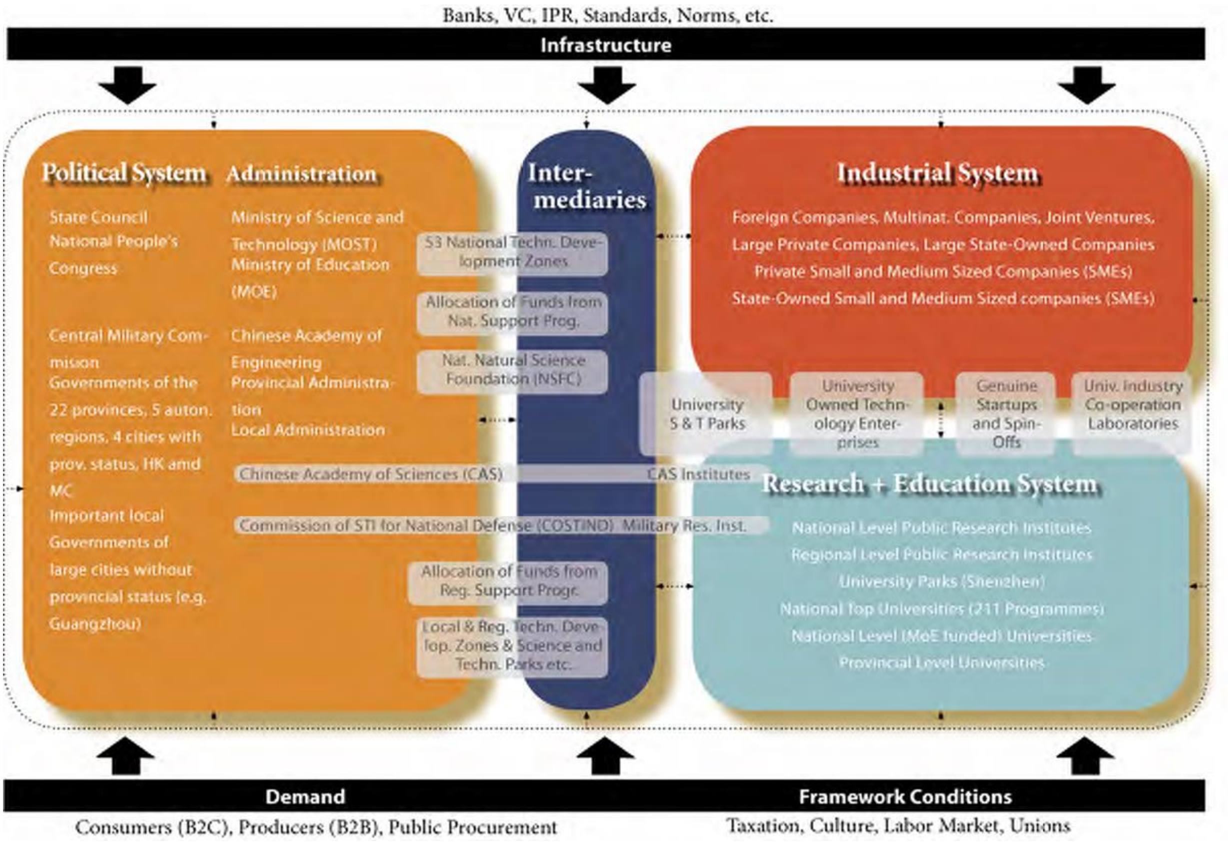

Figure 1: Overview of the Chinese Innovation System.

Source: Kroll, Henning / Conlé, Markus / Schüller, Margot: "China: innovation system and innovation policy", in: Fraunhofer ISI, Karlsruhe / GIGA Hamburg / Georgia Tech, STIP, Atlanta (Hrsg.): New Challenges for Germany in the Innovation Competition: Final Report, Aug. 2008, S. 169-242, online: URL: [http://www.isi.fhg.de/p/download/new_challenges_for_germany.pdf], S. 172.

The following key institutions are the main stakeholders of the public science system on the national level: The Ministry of Science and Technology (Ministry of Science and Technology (MOST - 中华人民共和国 科学 技术 部),the Ministry of Education (MOE - 中华人民共和国 教育部), the Chinese Academy of Sciences (CAS - 中国 科学院), the Chinese Academy of Engineering (CAE - 中国 工程 院), and the National Natural Science Foundation of China '(NSFC - 国家 自然科学 基金 委会),the Chinese Association for Science and Technology (CAST - 中国科学技术协会) and . Further public institutions of relevance for the innovation systems are the National Development and Reform Commission – NDRC /中华人民共和国发展和改革委), the Ministry of Industry and Information Technology (MIIT – 中华人民共和国工业和信息技术部) and the Ministry of Commerce (MOFCOM – 中华人民共和国商业部).
The general division of labor and authority among these institutions is as follows: MOST and MOE as well as the other national ministries and commissions all have authority to determine policy guidelines. CAS and CAE have advisory powers and the NSFC is mainly responsible for the task of promoting mainly basic research projects. Concerning R&D and issues of technology transfer, any other sectoral ministry in China comes also into play through their responsibility for the respective state-owned enterprises of their sector as well as for their own research institutes, although the formerly large number of these research entities has been already reduced following the structural reforms in 1998. For overlaps of policy contents and responsibilities of the different ministry-level institutions, competition and duplication of actions are obvious. On the institutional level in the research sector, the top universities of the country, as well as individual public research institutes (esp. of CAS), play also an important role. This is also due to the growing financial independence through economic cooperation, spin-off companies and contract research which was first caused by the political drive towards commercialization and support of national economic growth which started in the 1990s.
This process has been accompanied by several waves of privatizations of research institutes, especially in the applied research sector with close relation to high-tech development. Together with the growing amount of Chinese enterprises and the diversely financed trans- and multinational companies and their increasing number of own R&D entities, this rough sketch of technology-relevant stakeholders in the Chinese innovation system is almost complete.
In addition, through large structural funding schemes, especially since the 1990s many new R&D and high-tech entities has been added to the system as new innovation drivers, for instance the State Key Laboratories as leading research institutions, the National Engineering Research Centers (see below) and various kinds of high-tech, science, incubators or industry development zones etc.
Furthermore, this innovation policy structure of the national level is mirrored on the regional level so that for most of the institutions, local equivalents exist with the respective tasks and responsibilities.

An important characteristic of the institutional structure in China, which also applies to the innovation field, is the lacking collaboration and coordination between the different public stakeholders, which leads to a comparable high degree of inefficiencies in the overall system.

The trans-regional coordination and collaboration in the Chinese innovation system are also rather weak. This leads to another crucial aspect of the discussed topics of KET with relation to China: Until today China is marked by strong regional disparities with a dominance of the eastern provinces in economic, social and especially scientific and technological development.
During the last decade the Chinese government tried to apply inverse strategies to develop the western parts of the country. These efforts once again were adapted in many different ways, because despite the general validity of the central government policy, in practice regions have a certain scope of interpretation of those policies according to their local situation. This resulted in an even more diverse combination of local strategies,

development speeds, and currently an even more hybrid picture of the overall development stage in China. The effect is also a manifold variety of regional innovation systems in China.

The definition and support of key technologies and high-tech industry fields through the relevant funding instruments of the Chinese innovation system constitute another constant characteristic during the current reform period. This selection of strategic fields also carries traditional traits of the former planning economy with regards to the rigorous commitment to the announced goals and the strict demarcation against other areas.
Hence, the top-down selection of key technology fields and so-called pillar industries accompanied the innovation policy in China for more than three decades. Meanwhile it has been periodically adapted to current developments and new political strategies such as new policies regarding environmental protection or energy efficiency. In 2009 this development culminated preliminary in the announcement of the current seven 'strategic emerging industries' (explained in detail below), which regarding their political impact and strategic orientation can be compared to the concept of KETs.
Most of the public policy support for key technologies and industries in China has been focused on the leading big (state owned) enterprises, but currently tries to become more effective also on the SME level. Again, despite of diverse related incentives through taxation and credits for R&D-engagement used to a large amount by SOE, foreign-invested companies are most active (e.g. by establishing own R&D entities), followed by private Chinese enterprises.

Another recent element of this tendency is the national strategy of indigenous innovation (自主创新) which was postulated within the national "2006-2020 Middle-Long Term Development Plan for Science and Technology". This strategy often has been interpreted as a "techno-nationalist" reaction on the earlier focus on lower levels in the globalized value chains, and on concerns regarding the still very high rate of technology imports. In general, "indigenous innovation" stands for the political purpose to positively shift China's position in the global value chain so that China's sustainable competitiveness can be assured in the future.
With this strategy the Chinese government again increased its control over China's innovation resources. The extent of state-funded and government-led mega projects even surpassed former top-down oriented schemes for the development of certain key technologies. As another factor, newly established public procurement tools supported the orientation on the domestic market.
It is argued that recent policies in the context of indigenous innovation come prematurely with respect to China's current state of technology and innovation capacities. Through measures related to domestic standard setting with the claim of universality, public procurement and the focus on quantitative, though low-level, patent increase, spill-over effects from MNCs for instance might be limited as one negative side-effect.

1.2. *Organisation of mKETs policy*

The Chinese government has decided in 2009 to give special support to a number of technologies which they deem of incredible relevance for the future of China. These technologies are called "the seven strategic emerging industries" and they are a key element of the current "National 12th Five-Year Plan" (中华人民共和国国民经济和社会发展第十二个五年规划).
Under this overarching national plan, the State Council has released a related "12th Five-Year Plan for the Strategic Emerging Industries" (十二五"国家战略性新兴产业发展规划). These seven industries are: energy saving and environmental protection industry, new generation of information technology industry (partially including photonics), bio industry, advanced manufacturing industry, new energy industry, new materials industry (partially including nanotechnology), and new energy vehicles. They are not completely identical with KETs, but have a large overlap. As the word or term "key enabling technologies" does not exist in Chinese language and are not used in policy making, we can only have a closer look to these seven strategic emerging industries.
It is intended that for every industry mentioned here a detailed so-called "implementation plan" will be released in the next months. While the overall plans determine the topics, strategies and the goals, these implementation plans usually mention more detailed measures how these goals shall be reached and how the strategies shall be implemented.

The “12th Five-Year Plan for the Strategic Emerging Industries” does not mention the support of pilot lines at all. There are some references made to the support of demonstration projects, e.g. for solar energy or new materials. There is no indication that these demonstration projects do include the support of pilot lines as policy measures.
An analysis of the sub-plans issued as structural extension of the “12th Five-Year" National Strategic Emerging Industry Development Plan did not confirm a political focus on pilot lines either. The related plan for new materials (新材料产业“十二五”发展规划), the plan for high-end equipment manufacturing (高端装备制造业“十二五”发展规划), the plan for new energy vehicles (国务院关于印发节能与新能源汽车产业发展规划（2012—2020 年）的通知) and the plan for biotech (国务院关于印发生物产业发展规划的通知) all mention repeatedly the practice-oriented issue of (industrialization) demonstration bases, but again do not refer to pilot lines as a concrete strategy in this area. To our best knowledge there is no policy document available that deals with multiKETs.

None of the interviews touched on legal aspects in China.

1.3. *Main policies for Pilot lines*

As stated above there is no special policy in China dedicated to the establishment of pilot lines. Yet there are a number of policies which indirectly support the implementation of pilot lines.

a) The ‘Key Technologies R&D Program’ (国家科技攻关计划; since 2006: 国家科技支撑计划), was introduced in 1982. It is the earliest of the major programs for science and technology on the national level since beginning of the reform era. The program sets clear top-down priorities according to the development of (politically defined) economic and social needs, with a view to commercially exploitable research fields areas. It provides funding for strategically important areas of technology and the development of China's industry in the promoted areas. These research fields are adjusted which each Five-Year-Plan and therefore some fields remain the same, while others can be dropped or added, again according to the political needs.

b) The ‘863-Program’ ('高技术研究发展计划 ") is also a medium-to long-term strategic development plan as well as a funding scheme. It aims at providing development guidelines and support for a selection of high priority technology areas in order to increase Chinas international competitiveness in these fields and develop R&D capacities in high technology. At the time of the initiation of the program in 1986 it first focused on the seven research fields of biology, aerospace, communications, laser, automation, energy and new materials.
In the current period of the 12th Five-Year Plan the 863-Program has the major tasks to advance cutting-edge technologies and to address fields of national long-term development and national security, as well as to foster strategic emerging industries. Hence, the key high-tech fields supported in the 863-Program are now: information technology, biotechnology and medical technology, new material technology, advanced manufacturing technology, advanced energy technologies, resources and environment technology, marine technology, modern agricultural technology, modern transportation technology and earth observation and navigation technology.

c) The ‘Torch Program’ (火炬计划) was launched in 1988 by the Chinese government. It targets the promotion of high-tech industrialization in China through scientific and technological innovation. Development and commercialization of high-tech products are to be advanced through the Torch Program, with both extensive structure-building effects within China as well as international visibility. For this goal the program tries to create a positive legal and administrative environment and encourages scientific and technical staff to found start-ups in the fields of new technologies.

d) The ‘National Key Basic Research Program' ('国家重点基础 研究发展计划') or 973-Program was initiated in 1997. Like its predecessor, the Climbing Program, it supports the development of the national basic research in selected key research areas. However, the in fact rather strategic research goals of this funding scheme should also keep an eye on future social and economic issues relevant for China’s development.
Another important aspect of this program is its postulated function of training qualified S&T personal in China.

e) National Engineering Research Centers
The "National Engineering Research Centres" (NERC / 国家工程技术研究中心) is a programme established during the 8. Five-Year-Plan (1990-1995), with the strategic goal of facilitating the way from the lab to factory so that new, marketable technology applications could be developed domestically. The primary research areas of NERCs are agronomy, new materials, resources and exploration, energy and transport, industrial engineering, IT / telecommunications, life sciences, medicine and pharmacology, as well as construction and environment. Meanwhile around 300 national NERC were successfully set up at large research institutions in the sector or in large industrial enterprises.

f) New National Industrialization Demonstration Base
The "New National Industrialization Demonstration Base" (国家新型工业化示范基地) is a funding scheme which is administered by the Chinese Ministry of Industry and Information Technology (MIIT). The program was launched in 2009 and since then serves to enhance China's industrial strength by optimizing and adjusting the industrial structure.
Industrial development parks in China are the main carrier of this infrastructure program. These parks should be in the leading industries and should integrate indigenous technological innovation, combining military and civilian sector, energy efficiency, production safety, development of regional brands and development of human resources.

g) Innofund Program
The Innofund Program for SME organizationally is part of the Torch-Program (34 million USD in 2010), but makes up a much larger part (675 million USD in 2010). The Innovation Fund for technology based small and medium sized firms (科技型中小企业技术创新基金) is a special program to support high-tech SME with an emphasis on the seven strategic emerging industries. The goal of this fund is to support SME in bringing their innovative ideas into the market, focusing on the commercialization phase of their R&D developments. This includes the establishment of pilot lines, as the guiding principle is that products, which are still in the research & development or in the pilot phase, can be supported. The funding volume per innovation project with a maximum of 250.000 Euro is rather low considering the general costs of pilot lines.

In the above mentioned as well as in other major S&T funding instruments of the Chinese government, pilot lines are *not directly* financed and supported. However, interview partners referred to these schemes as funding sources of their pilot lines, as they provide the framework for support for broadly defined technology transfer and commercialization activities or – according to the wording in the official Chinese documents – industrialization demonstration measures (产业化示范). Some partners also use the large R&D programs to partially support their pilot lines.
Support by national and regional government is seen differently by academia and industry. While industry receives around 30% of public funding, some institutes manage to get as much as 50% of public support for the implementation of their pilot lines, while others only have around 10%. Especially in new material development (e.g. car batteries, solar cells) companies seem to be able to receive a higher share of public funding, as these are priorities for national technology development.
Funding is available at the national and the regional level and for different stages of the pilot lines (some more oriented toward TRL 6, some more for TRL 7), depending on the funding agency. Funding from local governments has been mentioned as more practical oriented and less bureaucratic.
No matter on which level the support is, the funding is always through application of larger R&D projects or commercialization projects. This is the result of the lack of a special policy and instrument to fund pilot lines. So their funding is only indirect and can only be a small proportion of the overall project. Even though theoretically some funding would be available, companies and institutes sometimes find it too time consuming to apply and rather try to find private investors. To summarize, the interviewed stakeholders think that there is not enough funding and not enough policy support for the implementation of pilot lines.
Public procurement does not play a role, as it was only mentioned in one interview. This company stated that the market often does not trust new products in China and that government procurement would be able to

send positive signals to the market, that their products are trustworthy. This company in the past had public procurement support from their local government.
China has a rather supportive overall tax policy for R&D intensive businesses. They can get a 150% tax deduction for their eligible expenditures (basically R&D investments) and some companies make use of these tax reductions to support the funding of their pilot lines. Demand side policies are not very common in China yet. Government is experimenting with subsidies for buying electric vehicles, yet the effect cannot be judged from the interviews or the background studies. In the case of the photovoltaic technology the lack of demand side policies was mentioned, as these companies felt the difference to the European market, where demand side policies are more common than in China and they wished for more demand side policies in China.
Commercialization support is embedded in many of the above mentioned programs and again indirectly supports the establishment of pilot lines to some degree. The support for high-tech investment is especially high in local governments, which have a tendency to support the funding of equipment to increase the technology capability of their enterprises. Chinese governments on different levels also try to increase collaboration between industry and public research, yet because of the trust issue and the perceived risks in sharing any know-how and IP these policies seem to have no visible impact on the establishment, on the implementation and on the shared use of pilot lines so far.
Venture capital is playing an increasing role in the last years and there is some more potential for the future. As some pilot line owners stated, they prefer to get venture capital or support from pure investment companies compared to co-operations with other productions companies, being their competitors, suppliers or customers. A lack of suitable national partners which have a similar technology level and similar interests has also been mentioned as reason why cooperation is still rare.

2. Business perspective

When discussing the Chinese perspective, it needs to be made clear that at the current stage of development neither in policies nor in businesses the term "multi-KETs" is being used. So business partners only refer to one technology field, even though when one would be able to look very deep, there might be other technologies involved. We believe that because there is no language for mKETs, there is also no awareness for it. The following results have therefore to be seen in this framework.

2.1. *Implementation of multi-KETs pilot lines*

Regarding the main needs for implementing pilot lines, companies and institutes agreed that more financial support would be beneficial, especially compared to the 1990s, when a lot of direct funding for pilot lines was available. The main success factor mentioned was if the technology was mastered well enough to be transferred from the lab to the pilot line and then from the pilot line to mass production. Very important were also well trained people to implement and run such pilot lines.
Neither "inter-technological" communication nor multi-KETs know-how networks could be identified in China.

As a result of the historical development in China, the main drivers for pilot lines are industry and RTO/academia to almost the same amount. Until the end of the 1990s, the main driver for pilot lines was the government, which led to the establishment of pilot lines mainly in universities and public research institutes. After a policy change in 2000, when many major applied research institutes nationwide were transformed into companies, government considered the establishment of pilot lines a task for industry. Since then these former applied research institutes make up a large part of China's high-tech enterprises and they are still maintaining comparable large R&D departments. At the same time they have an interest to bring their new developments into the market and use pilot lines to do so. In the last 10 years universities and public research institutes have also received more pressure to commercialize their research results. In order to do so, these institutions also establish pilot lines at their premises. So today the market might be the largest driver, yet to a lesser degree than in many developed countries, as public research institutes still constitute a larger part of pilot lines owners and they are not always driven by the market. In cases related to public health or food safety, government is still the main driver for pilot lines.

In theory the pilot lines funded in public research institutes should have a rather open business model and serve as a technology platform. In reality it seems that this is still rarely the case. The reasons for this mentioned by the interviewees are mainly a lack of trust, weak IPR protection and the need for the scientists to make money. (In China, the basic salary of scientists is very low, they have to get projects to get additional income and many scientists hope that if they can sell the complete pilot line with the product in the end, they get more money than through sharing the pilot line.) Institutes also experience difficulties in convincing enterprises to share the investment for the pilot lines, as many Chinese companies would rather wait until the product has been successfully tested in the market before they invest. On the other hand trust plays an important role here again, as companies do not trust the institutes to keep their company's information and secrets disclosed when sharing the use of a pilot line. So the companies rather buy the final product for a higher price than collaborating with the university/institute in a pilot line.
The situation in the interviewed enterprises is similar. Most enterprises state that they use their pilot lines alone, especially if they believe that there is a significant market potential. Some companies seek additional partners, but prefer them to be pure investors instead of production companies. In cases where they are unsure about the market potential, they are willing to share the pilot line with another production company and there is a clear trend to only invite one other company into that cooperation.
Proximity of partners only plays a role when the pilot line has received regional funding, because then the technology development has to stay in the region where the funding is coming from (e.g. city or province) and partners need to be from the same region, too. Otherwise expertise seems to be more important, yet keeping in mind that there are not so many partners involved at all.

2.2. *Evaluation of KET policies/KET innovation eco-System*

Public procurement has been identified as a very helpful measure for the success of pilot lines in China. Public procurement of newly developed products from pilot lines seems to be far more important in China than in Europe, as trust is, according to the interviewees, gained much more through the relationship than through the quality. If government procures such a new product at a very early stage, the market will trust it much more than without. The influence of public procurement therefore goes beyond the diffusion of the technology itself, but of course has a high impact on it.

As a special case one company has been interviewed, that acts as some kind of intermediary between academia and industry. This company is a spin-off company from a public research institute, which was founded in the late 1990s and which has implemented more than 14 pilot lines since then. They specialize in the implementation of pilot lines for their customers, which can be from a local government, academia or industry (most are from industry), in the field of agricultural biotechnology. After completion of the pilot line, they hand it over completely to the investors or customers. If government financially supported the pilot line, the pilot line will be run as a public technology platform for many companies. It is this company’s advantage that they can run and coordinate such a platform to the benefit of all, if only one company would run it, there would be many problems.

Pilot lines have been influenced by politics in the past especially through the transformation of applied research institutes into companies. At the same time government stepped back in being a driver for pilot lines and let the market/ enterprises be the drivers. Today around 60-70% of pilot lines are run by companies, with a larger proportion in those transformed companies, and 40-30% are run in public research institutes, their spin-offs and universities.
The national planning in China also heavily influences pilot lines, because through the selection of technological priorities (e.g. the strategic emerging industries) the funding priorities are set, too, and pilot lines outside these special fields might be more difficult to establish.

Most pilot line owners did not mention any important barriers for the implementation of pilot lines. Government support could be better, but generally they agreed that they were able to establish any pilot line they needed. Among the available funding opportunities within larger funding schemes, the varying selection criterias of the different funding institutions and administrative levels and – correspondingly – missing cross-institutional linkages between the different programs were mentioned as rather structural problems in China. In this regard it was especially mentioned that the lack of policy coordination between the research projects funded by MOST, which lead to a small scale lab production and the commercialization projects funded by NDRC has proven to be ineffective. Many promising projects from the lab don’t get a chance to be tested in pilot lines because there is still a large gap between the two policies and only a better coordination could close this gap. This is seen as a systemic barrier that currently exists and which the individual company is unable to overcome.
Not mentioned as a barrier, but observed as a barrier for the shared use or for the creation of new business models of pilot lines is the prevalent lack of trust among the key stakeholders. Companies do not trust each other nor do they trust the researchers and they are constantly afraid of losing their IP or other sensitive knowhow when cooperating. This seems to be to a much larger extent then we know from European countries, where these worries exist as well, but were the rule of law dominates and where more reliable ways can be found to minimize these risks than in China.

3. Conclusions

3.1. *Summary of policy perspective*

As China currently does not have special policies to foster the implementation of multi-KETs pilot lines, it is very difficult to derive a suggestion for the EU. It could be argued that the joint funding from national and regional level, which both have different requirements and support measures, seem to be a good fit for the current situation in China. While on the national level the innovativeness and the R&D part is still stressed, local governments are more practical with the support for equipment and facilities.

3.2. *Summary of business perspective*

Chinese owners of pilot lines strongly believe that government support, even in its currently indirect form, is a main success factor for pilot lines. If government would support their newly developed products through public procurement, it is believed that it would have a tremendous impact on their development and implementation due to an increase in public trust. This would benefit the diffusion of new technologies in China. Yet so far no such policy exists, yet some regional governments obviously sometimes use public procurement to support their local companies' technology development.

A lack of coordination and cooperation between different funding institutions, policies and programs is seen as a major barrier for a broader implementation of pilot lines in industry. A lack of mutual trust between the actors (companies and institutes alike) is the most significant barrier for the implementation of shared pilot lines, new business models and more open co-operation along the value chain.

One company has been identified in the field of agro-biotechnology, which acts as an intermediary for the implementation of pilot lines. The company plans, designs, implements and even runs pilot lines for various customers across China. During the years they have established a certain kind of expertise for the implementation of pilot lines, including the possible funding sources and support policies available for them, which supports companies and institutes in successfully establishing pilot lines. This company especially fits for China since it bridges the mentioned gap of coordination between the other stakeholders.

3.3. *Recommendations to support pilot lines*

As mentioned above, it seems to be rather difficult to derive concrete recommendations for the EU from the Chinese experience. Yet the above mentioned intermediary company, that offers the whole range of services for the implementation of pilot lines could be an interesting idea for Europe as well since there are also many different stakeholders and interests to be coordinated.

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4.2. *Interviews*

[Please list your interview partners.]

- Zhang Yanqi, Senior Engineer, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences
- Prof. Dr. Liang Wei,Institute of Biophysics, Chinese Academy of Sciences
- Prof. Dr. Jiang Tianshui, Director, Beijing Zhongke Qianfang Biotechnology Institute
- Dr. Luo Xin, Beijing Academy of Science and Technology
- Dr. Zhu Dunzhi, Sunpo Beijing Solar Energy Research Institute, Co., Ltd
- Prof. Dr. Zhuang Weidong, General Research Institute for Nonferrous Metals
- Zou Yufeng, Lishen Battery Systems Co., Ltd
- Prof. Dr. Du Wansheng, Central Iron & Steel Research Institute
- Prof. Dr. Geng Jiandong, High Technology and Research Development Center of MOST
- Liu Chun, National Center for S&T Evaluation of MOST

5. Annex

5.1. *Pilot line examples from China*

China Iron & Steel Research Institute Group (company)	China	Beijing	Pilot lines for amorphous alloys has been successfully transferred into mass production. They now produce 10000 tons per year. During the pilot line stage they produced 100 tons per year, up from 700g in the lab stage. Funding was acquired through their own stock listed company, not through government support.
Lishen Milles Power Battery Systems Co., Ltd.	China	Tianjin	Pilot line for the development of batteries for electric busses.
General Research Institute for Nonferrous Metals (company)	China	Beijing	Pilot line for the development of battery material for electric vehicles. About one third of the costs they can cover via government funds, they apply for R&D projects in the national and local programmes and then can use part of this money for the pilot line. The rest of the funding is coming from the company itself.
General Research Institute for Nonferrous Metals (company)	China	Beijing	Pilot line for luminescent material. About one third of the costs they can cover via government funds, they apply for R&D projects in the national and local programmes and then can use part of this money for the pilot line. The rest of the funding is coming from the company itself.
Sunpo Beijing Solar Energy Research Institute Co., Ltd.	China	Beijing	Pilot line in the field of solar thermal technology. The company received around 50% of public funding from the local Beijing government, all through funding of R&D projects.
Sunpo Beijing Solar Energy Research Institute Co., Ltd.	China	Beijing	One pilot line in the field of equipment manufacturing for solar thermal energy. The company received around 50% of public funding from the local Beijing government, all through funding of R&D projects. The pilot line failed and they now buy all equipment from external partners.
Institute of Biophysics, Chinese Academy of Sciences	China	Beijing	Planned pilot line for antibodies. Shall be used by the institute and its direct partners by around 60-70%, the rest can be used by external institutions.
Institute of Biophysics, Chinese Academy of Sciences	China	Beijing	Planned pilot line for nano-based drug delivery. Shall be used by the institute and its direct partners by around 60-70%, the rest can be used by external institutions.
Institute of Biophysics, Chinese Academy of Sciences	China	Beijing	Planned pilot line for tumor detecting. Shall be used by the institute and its direct partners by around 60-70%, the rest can be used by external institutions.

Further pilot line examples identified in the study were no to be disclosed.

Situation in China

We have interviewed companies that have pilot lines in China and we have added the information we received in the attached table. In addition, we have done two extensive internet researches, one at the beginning of the country study and one at the end. For the search we developed a list of Chinese key words together with Chinese experts, so that we were able to search in Chinese language completely. In both cases no valuable information about the existence of pilot lines was found on Chinese websites via our searches.
Our explanation is linked to the findings of our country report for China. As the government does not have any specific policy to support pilot lines, the companies and institutes have no reason or incentive to put this information on their websites. The websites of companies and institutes are often used to show what has been done with government funds, so that officials can easily see their success.
Secondly, pilot lines are usually not open for other partners or external companies, even though those that receive funding from the government through other funding instruments are asked to open them.
Even those who announce that their pilot lines are open, admit in the interviews that they haven't shared them yet or don't intend to open them and that government does not control and cannot force them to do so. This is related to a huge amount of mistrust in the Chinese academic and technological system and also in the fact that so far there has not been much inter-company research or development going on in China.
As the companies do not really seek co-operations for the pilot lines, they do not put this information on their websites. This altogether explains why we could not identify more pilot lines via our internet searches.

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