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Path taken by ZEFa project on
innovations in the sphere of
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Innovation policies in Uzbekistan: Path taken by ZEFa project on innovations in the sphere of agriculture

Shtoby bumaga rabotala nujny nogi (so that the paper works legs are needed)
(14.03.11, SANIRI)

Dr. Rano Turaeva

Abstract

The paper describes the existing mechanisms of innovation diffusion particularly focusing on the initial phase to introduce the results of innovative projects into the government system of Uzbekistan. The paper aims to analyze the existing bureaucratic, legal and political matrix for the introduction of ZEF project innovations into practice. The innovations developed by the staff of the ZEF/UNESCO project in Uzbekistan range from their content and purpose of use from technological to institutional ones. The innovations considered in this paper are mainly technological ones. The analysis will be supported by two other examples of innovation diffusion by international projects in Uzbekistan.

Based on the theoretical analysis of my empirical data I argue that a functioning innovation system is on the way to be developed to completely function in Uzbekistan. There is rather knowledge ecology to use Foray's term which could further serve as a basis for the future innovation system. This argument is substantiated by empirical study of our project innovations and their individual paths to their diffusion detailed in this paper.

Keywords:

Land Politics, Innovation, Agricultural Politics in Uzbekistan, State, Central Asia

Introduction

The paper aims to analyze innovation systems in Uzbekistan with regard to organizations (formal structures), institutions (sets of common habits, norms, routines) and linkages (interactions) between the both (to follow Edquist 1997; Erika Kraemer-Mbula and Watu Wamae 2010:43). Methodologically, I do this through studying the process of implementation of international project innovations into practice namely by applying an inductive approach (from micro to macro level) to the study. Therefore, I will consider each innovation individually to follow their paths in order to find out the existing channels for innovations in general and also to be able to draw conclusions about these channels and their qualities.

My empirical data shows that the existing legal and infrastructural background for diffusion of innovations is on the way to be fully established. The mechanisms to diffuse innovations are still on the way to be established. Legal basis for national innovation systems are still in the process of development. A coordinator of the UNDP project on the development of innovation system of Uzbekistan stated that they are given a task to develop a project of the law regulating innovation activities and their diffusion. The law is expected to be submitted by 2012.

I argue that there is so-called knowledge ecology, to use Foray's term which can serve as a basis for future innovation systems in Uzbekistan¹. He defines knowledge ecology as

involving all kinds of institutions and organizations dedicated to the production, dissemination and utilisation of new and 'superior' knowledge. The knowledge ecology encompasses not only the activities of R&D institutions but also the more applied research activities of public and private firms, as well as programmes for educating and training the technical workforce. The knowledge ecology determines the conditions of existence of knowledge. However, it is not itself a system of innovation. The role of knowledge ecology is to form the research capabilities and the knowledge base for innovation." (Foray 2010:97)

My argument is supported by bringing the examples of diffusion paths taken by our project innovations as well as the analysis of their probable outscaling. These examples will be supplemented by other project innovations of other International Organizations namely the introduction of a new crop of Soya beans by AVRDC (Asian Vegetable Research and Development Centre).

The data for this paper was collected by means of using mainly qualitative methods including semi-structured and structured interviews with experts, government officials, project staff members who were directly involved in the preparation of the material on the innovations submitted to the government. The fieldwork was done during two months of field research in 2011 based in Tashkent and with a short visit to Urgench, Khorezm province. The previous fieldwork was conducted during three months of field research in 2010 also based in Tashkent and shorter visits to Urgench.

The paper is structured in the following way. It starts with a theoretical introduction of frameworks and approaches for analysing my empirical data. Then a brief overview of innovation systems of Uzbekistan will be provided. I will continue to present my empirical material namely I will introduce three project innovations submitted to the government last year and the related issues concerning each of them. Two case studies of other project innovations namely the introduction of Soya beans

¹ I will explain this theoretical framework of knowledge ecology and systemic approach to innovations later in this paper.

into mass production and outscaling of the innovation by SANIRI (Central Asian Research Institute of Irrigation) will supplement the examples of our project innovations. I will conclude the paper with remarks on the possibilities and difficulties related to the diffusion of innovations within the system of agricultural production of Uzbekistan.²

² Before I would like to stop on some of the important key terms that will be used in the text and their meanings because English translations of Uzbek key terms cannot always explain a full meaning of the procedures that are behind these. The most important term is *vnedreniye* in Russian and *tadbiq qilish* in Uzbek, English equivalent could be 'implementation' but I will use this verb to define the process of actual use of an innovation in agricultural production. Another verb to translate the above terms is 'to diffuse/diffusion' will be used in the meaning of implementation of innovations into practice and here the scale of use will be emphasized as well as accent will be made on the process spreading or multiplication. Our project uses also two more English terms related to these verbs are 'upscaling' and 'outscaling'. The former indicates innovation diffusion within one province and the latter nationwide diffusion. *Razmnojenye* is another Russian term I came across when talking about an introduction of a new crop variety which indicates to the actual process of growing/producing seeds in other words establishing a seed supply basis for a new crop. I translated it as 'to multiply' which is a direct translation from Russian. *Rayonirovaniye* is another Russian term used to indicate that a new crop has been designated to various, several or all provinces of Uzbekistan and entered into the state registry called REESTR. For this term English equivalent of 'outscaled' can be used in the meaning of nationwide diffusion of the innovation. *Utverjdat'* is another Russian word, also used as a borrowing in Uzbek, translated as 'to approve' into English. The meaning of this verb is 'to officially approve' by an official who has a right to approve certain documents by means of a stamp and his signature. Without this approval, documents are not usually considered as legitimate and in some cases can not be accepted by certain departments or state organizations. Approval system in Uzbekistan creates a dependency chain where all or most of the important state institutions have their play in one or another decision making chain .

1 From knowledge ecology to innovation systems: conceptual framework

Innovation theories and their connection to policy and development have been debated since late 1970s (Lynn K. Mytelka and Keith Smith 2002; OECD 2007; Furtado 1961). During this time economic crisis has been catalysing various developments in theory development and policy reconsiderations in certain contexts mostly effected by these developments. 80s have been characterized by evolutionary theories (Spencer Nelson and Winter 1982; Cooke 1996) which projected a linear path of development from the least developed to developed stage. This was analyzed in terms of particular stages of development necessary to reach the status of developed countries. In this context of development studies there has been a basis for looking at innovation processes. The pioneer authors have established a framework where the connection was made between innovation and policy development (Lynn K. Mytelka and Keith Smith 2002; OECD 2007). During the same time 1970 Sussex Manifesto has been first published where Science and Technology has been causally linked to development. The link between innovation and development has become an umbrella framework for studying developing countries (Erika Kraemer-Mbula and Watu Wamae 2010; Edquist 1997, 2004; Foray 2010; Andersen 1992; Fischer 2001; Lundvall 2003, 2007; Nelson 1993; Johnson 1998; Edquist and McKelvey 2000; Edquist and Hommen 1999; Cooke 2000; Andersen et al. 2000; Breschi and Malerba 1997). In these scholarship innovation has been approached both as “ routes to national economic growth” (Sussex Manifesto 2010:6) or innovation as “new ways of doing things” (Sussex Manifesto 2010:1) and as “a key driver for development” (Erika Kraemer-Mbula and Watu Wamae 2010:30). I suggest that innovation is neither the route nor the engine of this process and rather the process itself which has its own engine and its route with its own direction. In this process of innovation knowledge is one of the main components which make up this engine. The route, an innovation takes is difficult to predict whether this route leads to development or not. This is dependent not only on the engine but also on other structural conditions as well as environment or ecology to use again the term from Foray (2010) within which the process of innovation occurs or moves.

Structuralist views on innovations have been a critical turn from the evolutionary theories. Evolutionary theories view the process of development as static, linear and sequential which undermines other social factors and background for these processes (Furtado 1961). Drawing on these views systemic approach to innovation and development marked the modern era of globalisation and development. The concept ‘innovation systems’ first appeared within the framework of evolutionary theorists (Freeman 1987; Lundvall 1992; Nelson and Rosenberg 1993, Edquist 1997). This approach to innovations, its systemic character, reflects on “the recognition that the conversion of *knowledge to value* is shaped by structural, institutional and social factors” (emphasis is mine, Erika Kraemer-Mbula and Watu Wamae *ibid*: 42). The main components of the innovation system are organizations (formal structures), institutions (sets of common habits, norms, routines) and linkages (interactions). “From a ‘systems’ perspective, innovation is regarded as ‘intricate interplay between micro and macro phenomenon where macro-structures condition micro-dynamics and ...new macro-structures are shaped by micro-processes’ (Lundvall 2007:101)”. The precondition for the innovations to be considered a system, its components should be connected or to use Edquist’s (1997:18) phrasing “system of innovation should be looked upon as a ‘whole’ because many of its elements are – more or less closely – related to each other. Otherwise there would be no ‘system’.” According to him (Edquist 2001:4) “[a] system consists of two kinds of

entities: there are firstly, some kinds of *components* and secondly, there are *relations* between these” (italics are in original). Therefore in the contexts where innovation development has not yet taken the forms and conditions of developed countries (especially provided that linkage is there and the components are connected), there is no innovation systems but rather ‘ecology’ to follow Foray (2010:97). He (Foray *ibid*: 97) argues that ‘innovation systems’ develop out of *knowledge ecology*. In order to find out whether there is an innovation system in place or not, empirical data on each country, using the above mentioned theoretical framework, is to be produced. This is important for formulating policy recommendations in favour of successful transformation from knowledge ecology to innovation systems in case the latter is not in place. In the following section I will do this by outlining existing mechanisms for the development of innovations and their diffusion which will be further supported by case studies of the project innovations in comparison to innovations of others.

The literature on innovation in developing countries distinguishes four main issues: 1.product versus process innovations, 2.innovation in low and medium technologies, 3.incremental innovation and 4. absorptive capacity (Edquist 2001). The distinction between product versus process innovations is important in so far as the former are “employment-creating” and the latter are “labour saving”. For instance, our project innovation AF (Afforestation of marginal lands) could fall under the category of product innovations since it is about creating consumable products, CA (Conservation Agriculture) or SA (salinity measurement express method) could fall under the category of process innovations since they save labour. The second kind of innovation will imply the loss of some jobs such as a job of a tractor driver, laboratory assistants or field assistants, to give an example. This distinction is not for the assessment of the innovations but rather for the purposes of formulating recommendations to consider those consequences during actual planning of the implementation of these innovations into practice.

Another important issue for the innovations under question is whether there is an absorptive capacity in place or not. It is defined as “a firm’s ability to recognize the value of new external knowledge, assimilate it and apply it to commercial ends (Cohen and Levinthal 1990 cited in Erika Kraemer-Mbula and Watu Wamae 2010:48).” This is important in the case of our project innovation CA where it is crucial that absorptive capacity is in place to accept new practices of soil preparation namely zero tillage, for example. This capability is “critical for providing solutions to local challenges by converting *knowledge to value*” [emphasis is mine] (Erika Kraemer-Mbula and Watu Wamae *ibid*: 49). This transformation is crucial and an *a priori* condition so that knowledge ecology develops into innovation system.

2 Legal and political background for innovation processes

In what follows I describe political and legal background for the innovation development in Uzbekistan. Research and development (R&D) and creating favourable environment for practical use of the results of the R&D activities including innovative projects is still a challenged field in Uzbekistan. The challenge consists of the several major issues pointed by a high profile state official (Interview, February, 2011, Tashkent). One of them is

mentality of the farmers, secondly legislative basis, it is not yet fully complete, I mean the laws on science, laws on innovation activities even there is not such a thing as the law on innovations and innovative activity; the last regulation in this sphere is from 2008. Then the questions of human/cadre potential (*kadroviy potential*), retraining of the existing experts, there is also a necessity for specialists who would establish this sensitivity [absorption capability], [...] there is no mechanisms for realisation of the results of scientific research works into the sphere of production. [...]

As it was already experienced by our project members during FTI process³ that a local stakeholders (at province level) were reluctant to introduce the proposed innovative methods in their work unless the orders to do so have been issued. There is a lack of empirical evidence on the experience of innovation diffusion in Uzbekistan. Studying these examples and feeding the findings of these studies into the process of legislation development would be necessary in order to have an efficient legislative basis for the future innovation systems in Uzbekistan.

New mechanisms of diffusing innovations have also been mentioned during the interviews with state officials. These mechanisms were starting to function to accommodate new innovations which I would call 'green grass' that comes out in the field of innovation system of Uzbekistan. These are structural changes which are being introduced currently and ongoing. There are also connections are being established among educational sector, research establishments and production units. The so-called innovation centres (20 of them) are working by now which are mostly located in the capital city only. Members of those centres are PhD students, post-docs and other faculty members who are involved in innovative research. Members of these centres directly contact manufacturers and try to diffuse their own innovations themselves.

These kind of structural changes are also happening in the government system as I was told and observed myself. This includes both spatial and organizational rapprochement of government organizations with research and educational centres. It is planned that the building of RPC of MAWR and may be also of MAWR itself together with some important research institutes will be relocated around or within the campus of Agrarian University in Tashkent. The recent appointment of the director of RPC as the rector of the Agrarian University in Tashkent who will be serving in two positions at the same time shows the signs of these developments.

The financial basis for the innovation development and its diffusion has also been established within the auspices of SCSTD. These and other changes can be said to be a positive start on the way of development of innovation systems in Uzbekistan.

To summarize, innovation systems in Uzbekistan has a sporadic character and the missing linkages are on the way to be established. There is growing collaboration between local research

³ See Hornidge et al 2011 for more discussion of the results of the FTI (Follow The Innovation) process by our project in Uzbekistan.

organizations and international scholars. This establishes a firm ground for developing absorptive capabilities which is crucial for innovation development and their diffusion. This collaboration has been also institutionalised in form of requirement for applying to state funding. Although the basic infrastructure is in place for performing primary supportive functions for innovative research, necessary interlinkages are still need to be developed there. This makes the existing infrastructure fragmented and hindering for the future diffusion of innovations. I show this especially with our project innovations. AF requires close collaboration or communication between forestry unit and agricultural production which obviously is crucial for the diffusion of this innovation. In case of CA there is an innovation transfer centre which might serve as a linking chain directly to several institutions such as the rules about introduction of new technologies, crops management, and methods of land cultivation for diffusion of the innovations. Such a linkage is necessary for this innovation since the innovation consists of several components, introduction of which are in the competence and authority of several departments within MAWR and other relevant organizations.

Therefore, we can speak about existing knowledge ecology rather than innovation systems in Uzbekistan. Knowledge ecology is made up of the above mentioned research and development institutes, educational programs and trainings mainly carried out with the support of international donors, some small initiative in the sphere of innovation development and their diffusion within Universities which is an infrastructural innovation in itself. Assessment mechanisms for the innovations are ambiguous and this still needs to be established and regulated. It seems that the introduction of new crop varieties has been well established and the system of assessment functions well due to the demand on the advanced sorts particularly of the strategic crops. This system has been there and established by the Soviet government since Uzbekistan was one of the main cotton supplier. There REESTR and its system of new crop introduction are in the centre of innovations dealing with new crop varieties in Uzbekistan as discussed in the following chapter.

3 Introducing new crop varieties in Uzbekistan: powerful institutions

3.1 REESTR and SSTC (State Sort Testing Center)

REESTR is a registry of those new crops that have been approved to be grown in the territory of Uzbekistan. Any new crop cannot be grown without being registered in REESTR. REESTR is updated annually. REESTR is finally discussed by the Ministry Collegiums Committee and they decide which of the new crops are to be included into the REESTR and which ones are going to be deleted. The REESTR is approved by *Karor* (an official document) at the Collegiums' meeting where the chair is at the same time the head of SSTC. The official document (*Karor*) is signed by the minister of agriculture and water resources himself and after this REESTR is subject for publication. When a new crop is marked as '*perspektivniy*' (perspective) this means that, the new crop can be '*rayonirovan*' (provincialise) means that it can be grown in all the provinces indicated in REESTR. For a new crop to be included into state REESTR, it has to be tested at SSTC.⁴

The role of SSTC is paramount in the decision-making system on new crops and their introduction into mass production. As one interviewee stated (Interviews, AVRCD Tashkent, March 2011, Tashkent)

[Without the SSTC's decision no further steps can taken even by state officials of higher echelons.] If I, for example, go to the minister and bring him my seeds or take him to my field and show him my new crops and how it grows, he will say that it looks good and will say that it should be *rayonirovan* (outscaled) verbally but this does not mean that the crop is outscaled formally.

SSTC tests a new crop up to three years and after this, the new crop can be indicated as perspective and on the third year it can be outscaled. After the crop successfully included into REESTR which means it was outscaled, the next step is called *razmnojenie*/multiplication. *Razmnojeniyeye* means the seed production is to be established in order to be able to deliver to the interested farmers. At the same time there is a question on the future of the new crop if it is going to be promoted by the project staff or authors themselves or included in the state planning system of introduction of new crops Republic-wide called *razmesheniye* (state planning of new crops).

3.1.1 Razmesheniye

Razmesheniye on the state crops (cotton and wheat) is a highly political question. As I show below, all of the procedures of this policy of planning agricultural lands are well regulated. On the other hand, this system does not allow market forces to take over the decisions made by authorities behind this institution of *razmesheniye*. *Razmesheniye* on cotton and wheat is signed at the Cabinet of Ministers. However, the *razmesheniye* of other crops is finally decided at MAWR. A state official explained to me⁵ (Interview, March 2011, Tashkent) the mechanism of *razmesheniye* which was also confirmed by a state official from the Academy of Sciences. *Razmesheniye* (from Russian 'placement'

⁴ I will discuss all the necessary conditions of application and the procedure of evaluation by SSTC later in this paper with giving the example of introduction of a new crop (Soya beans) by AVRCD in collaboration with a local research institute.

⁵ Interview, March 2011, Tashkent

of something/crops) is basically the planning process of what to grow on the available agricultural lands. In the first place, cotton and wheat are planned and the plan is subject for approval by the Cabinet of Ministers. The rest of the land is planned after the land was allocated for cotton and wheat. There are two methods of planning *Razmesheniye*, I would say, first 'top-down' and second 'bottom-up-bottom'. The former is practiced for strategic state crops (cotton and wheat), and the latter for the rest of the crops.

The second method of planning of 'what to grow and how much to grow' was explained to me by a state official with the local terms for each stage which seemed to be crucial.⁶ If I understood the state official correctly then the amount of land for strategic crops are planned from the expected yield and not the other way around. The rest of the land is planned for other crops, which have entered REESTR, and this planning enters into force with a *Buyruq* (from Uzbek 'Order' a document) from MAWR.⁷ These crops are planned in the following manner. First the provincial *boshkarma* (the provincial representative of the ministry) collects information from farmers about their plans for their lands which is then included into the report called *svodka*. This information goes further up to the provincial level (*oblast'*) continue upwards to the ministry. The ministry then makes an analysis for the whole Republic on the basis of supply and demand. Furthermore, it is additionally crosschecked with the state planning on vegetables and fruits and other crops. On the basis of these two criteria changes are introduced in the Meta planning of the crops on the land. The final decision (*okonchatelniy resheniye*) is issued at *Kengash* of the Ministry and are passed down to provinces so that they plan according to the *Karor* (Decision-legal document issued by the ministry) of *Kengash* at MAWR. On this basis, *pereraspredeleniye* (reallocation) is conducted. *Pereraspredeleniye* means the re-planning of the original planning of the lands (based on *svodka*) which have been earlier provided from below by farmers to *boshkarma*.

To my question how a new crop can enter to this system of planning he said that in order to introduce a new crop which had been newly entered into REESTR, an interested party should go to MAWR and meet the vice minister on farming (*dekhqonchilik boyicha*) and discuss the conditions for growing this crop Republic wide (*massoviy ekishga*). This person should provide an economic reasoning (*ekonomicheskij obosnovaniye*), be it in written form or oral, then the letter needs to be written to the Cabinet of Ministers and signed by Vice Minister or the Minister himself. This letter should indicate the importance of the new crop and its value in order to be considered for mass growing Republic wide. Additionally, there should be detailed information on the necessary conditions for this crop including how much land is requested, the amount of water, and the names of provinces where it is going to be grown. In case this is approved by the Cabinet of Ministers then the official task/order (*topshiriq*- an official order as a task with officially assigned persons and institutions) is issued by the Cabinet of Ministers and the appropriate personnel is assigned to fulfill the task. Only afterwards can the crop be entered into the planning of the land under *razmesheniye*.

A coordinator of AVRCD projects (Interviews, March 2011, Tashkent) expressed her opinion about this policy of planning the lands and said that

depending on economically important crops such as cotton, wheat for example for these crops the ministry [MAWR] implements this policy of *razmesheniye*, as to other crops after they were registered in REESTR any farmer is free to grow them in their lands. It is

⁶ Interviews, March 2011, Tashkent

⁷ Look for a more detailed discussion of the kinds of legal documents issued by various state agencies and their purpose of use in Turaeva (2010).

not like as it was during the Soviet Union it was carried top down what and how much to grow where. However there is a general policy of *razmesheniye* but not for small crops.

She indicated that for larger planning one should have seeds available which is another problem. She said that seeds are managed differently after the Independence. She stated that before *SortSemOvosh* (Sort Seeds Vegetables- a state agency) ordered the institutes to provide the seeds and used to sell to farmers. Now *SortSemOvosh* is similar to a private company because they buy and sell new good crops from Russia which has been entered into REESTR (*rayonirovaniy*), they also try to work on a contract basis with farmers, sometimes with institutes.

Institutions described in this chapter regulate centralised system of introduction of new crop varieties and planning of agricultural land in the country. Particularly, it can be followed from the procedures of planning agricultural lands the so-called policy of *razmesheniye*. Later in this paper I will bring concrete examples of experiences of actual introduction of new crop varieties through the above described system of land politics and new crops introduction.

4 Project Innovations submitted to MAWR

Our project has decided to submit four out of 19 innovations which according to the researches entailed the plausible promise of offering improvements to local agricultural practices (Hornidge et al.2011). Before they were submitted to MAWR and also to the Parliament Committee on the Agricultural Development, our project innovations were presented in the building of the Republican Farmer's Association building in a seminar with invited stakeholders from MAWR, Parliament members, research institutes and Academy of Sciences. There were four innovations presented by the project members and feedback has been received from the audience mentioned above. The feedback was important considering the status and roles of participants in the agricultural politics, research and production. At the end of the seminar the recommendations were produced by Parliament members who chaired the seminar in the format of a Communiqué.

As the next step four scientific reports have been prepared by project staff members for each innovation with the assistance of a senior advisor who had worked for the government in the past and was politically active at the time of this research. The reports were prepared by using a standard form for scientific reports based on GOST 7.32-2001 (a state registered standard for preparing official documents). The content of these reports mainly stressed their importance in the agricultural production, their economic benefits, as well as their novelty. The reports were signed by the authors of each innovation, senior scholars in the project, and collaborators of the project and stamped as approved by district *Khokimiat*. These two official stamps and the signatures were important to be seriously considered by the government in Tashkent (MAWR and Parliament).

In any international project activities and development of innovations within international projects it is of crucial importance to work in close collaboration with key stakeholders in the relevant field. Stakeholders are those persons and entities which play important and decisive roles in political, administrative, legal and economic decision making system. In the case of project innovations in the sphere of agriculture the stakeholders for further approval, implementation and dissemination of the project results and project innovations are first of all high officials at MAWR, RPC of MAWR, research institutes especially those belonging to the RPC, local *Khokimiats*. Therefore, a direct participation of some of these stakeholders makes a big difference at the end of any project and particularly in the phase of diffusion of project innovations. A state official from the State Committee⁸ said:

Here I think before doing anything or producing anything one should first identify a customer who is actually going to use it and work together with him then the implementation of anything new will be easier instead of first producing something and only then looking for the customer then it is difficult.

The feedback of local experts and state authorities at the very beginning of the project is crucial to consider in order to avoid any disagreements with the results of the project: This also concerns correct forms of documentation of each process of development of innovations. One of the assessment reports on the project innovation SA critically indicated that authors of this innovation had overlooked the similar works done by ICARDA and Uzbek Scientific Institute for Cotton Research on the use of similar tool and that the work is done “without the coordination and agreement of RPC MAWR” (Assessment reports from 09.12.10, MAWR, Tashkent).

⁸ Interview, February 2011, Tashkent.

Besides this of course the content of an innovation also plays role in what happens to its future. The head of application and assessment department at RPC stated regarding the content of the innovations and their importance in their further implementation:

Here as you see your documents are considered, the project is submitted, then the question is if it is really worth, if it is useful for our republic, what are the benefits to our farmers or *dekhqans*, and here they say if they write hey this is already an old work, and this is already the work done long time ago, it is not necessary to implement it then the answer is different, otherwise the assessment procedure is like this if this work is necessary or not, if it needs to be implemented or not, then we give it further back (Interview, February 2011, Tashkent).

To summarize, there are several things need to be taken into account when considering diffusion of any innovation. First of all, the innovation itself; what it is, if it has any components that would raise concerns be it financial or practical, if it interrupts with the state order or not, what is the legal background if it is favorable for fulfilling the requirements of this innovation. These questions are to be asked for each innovation when thinking about their diffusion. Then the question of administration and organization of the diffusion process arises. There mainly local *khokimiats* and local executive state agencies play decisive roles. In the following sections I will highlight some aspects of each submitted innovation regarding its content and its (content) implications for the innovation's future practical use and their diffusion.

4.1 Innovation one “Afforestation of marginal lands”

The innovation includes a set of measures to offer alternative use of ‘marginal’ lands⁹ by planting on these lands appropriate tree species (Khamzina, 2006; Lamers et al., 2008). These lands are registered as *de jure* arable lands and *de facto* not in use due to its high salinity composition.

The distinction between *de jure* and *de facto* status of farmers' lands is very crucial one for this particular innovation. According to the legal designation of lands in Uzbekistan there are lands which are registered as arable lands used for agricultural production, there are also lands registered in the accounts of (*qarashli*/belonging) the forestry department and lands under the protection of the State Committee on Nature Protection. All the lands are under the strict accounting system of the State Committee of Land and Cadastre (SCLRC). They make annual statistics called *zemelny fond (uchyotda)* and *zemelny balans*. This is done in the following manner. Districts (*rayon*) send their reports on their total lands to the provincial (*oblast'*) level *Khokimiat* (local governing administration) that then makes a total for the provincial level of all lands information to be sent to Tashkent. The State Committee for Land Resources and Cadastre sums up and makes a grand total accounting of lands for the Republic which is called *zemelny balans*.¹⁰ The report is issued as a land statistics for the date of January first on annual basis.

⁹ The name of the category of land is important. It would be better to use local terms such as “*zemli vyshedshiy iz selhozoborota po meliorativnym prichinam*” from Russian can be translated as ‘lands deregistered from the agricultural production due to meliorative causes’. The authors of this innovation the term “salt effected cropland areas within the irrigated areas and which become unproductive for cropping annual crops” (John Lamers, May 2011, email correspondence).

¹⁰ 2 Interviews with two state officials from SCLRC, May 2010, Tashkent.

A state official from SCLRC explained to me about the official regulations on types of lands and the regulation of these lands as following.

There can be various forms of afforestation such as tree plantations, *lesopolis*, *ormonzor* (forests), not arable forests, lands under the protection of State Committee of Nature protection. There is a special methodology used for taking care of lands, forests and is done by Land Cadastre. According to this methodology depending on the points of the soil it is decided what can be grown in this land and there is also a category of land called salinized based on the president's decree which amounts to 330000 ha but now it should become like more than 400000 ha I think. (A state official, SCLRC, May 2010, Tashkent)

In the report submitted to the government on AF authors rather recommend to transfer the degraded agricultural lands into forestry lands instead of using this innovation as a way to rehabilitate the degraded agricultural lands for a future agricultural production (the Report on AF submitted to MAWR, 2010, Tashkent). There are also lands designated to the Forestry Department of MAWR where trees are to be grown. This makes 19% of all lands in Uzbekistan.¹¹

In order to get the degraded land out of the accounts of arable lands for agricultural products and register as degraded the following procedures are necessary, as a high ranking state official explained to me¹² ()

Farmers have no rights to grow trees on the lands designated for agricultural crops because they are in the accounts (*uchyotda turipti*) and therefore they can grow only agricultural products there. In reality there will be no yields and many farmers are not able to fulfil the state plans, that is why it is necessary to correct the numbers and statistics on the lands in order to have a real picture of the lands and grow something which is possible to grow. In order to correct these numbers on land there should be a *Karor* (Order- an official document issued by local administration) issued by provincial *Khokimiat* (*tuman hokimligi*). On the basis of this *Karor* experts from SCLRC will analyze the land and decide what can be grown on this particular land and then *akt* [an official document] of this study produced by these experts. On the basis of this *akt* the *Karor* is approved by the officials shall be from SCLRC. This approval will be considered as the basis for the introduction of corrections into the Land Balance in the accounts of SCLRC. If the land to be categorized as degraded or deserted (*broслиy*) is large (equal or more than 3-4 thousand ha) then the decision is subject to the approval by the Cabinet of Ministers.

There was a suggestion to make changes in the laws proposed by an expert of the Parliament and an advisor of ZEF/UNESCO project to the Agricultural Development Unit of the Parliament concerning this innovation. The suggestion was formulated as following: "to free from taxes for 10 years those businessmen and farmers who create gardens, forests and plantations on those lands which have been taken out of the agricultural production or have been degraded and salinized and in the deserted conditions." The suggestion about creating an incentive for those who would like to take up this innovation is good, but the question still is whether this incentive equals the benefits from this activity as an alternative to agricultural production on productive land with taxes. Even in case there will be a real interest, there will be still a permission required for using those lands.

¹¹ Interviews, Forestry Department, MAWR, May 2010, Tashkent

¹² Interview, Forestry Department, MAWR, May 2010, Tashkent.

Another practical issue to consider for this innovation is the methodology to extract leaves from the trees which will serve as food for cattle. The authors argue about their (leaves') higher nutrition consistency but so far they state that this fact has not attracted so much of an attention or even no attention (the authors refer to the survey data mentioned in the report as well as Kan et al.2008). To my mind, the reason might be the lack of technology to extract leaves from the trees and therefore it might have been seen as something difficult to do with larger amounts.

4.2 Innovation two: Express salinity assessment (SA) with EM38

Innovation under abbreviation SA is to inform and show the application of EM38 - an express salinity mapping tool which could be used by irrigation planners at higher level of irrigation management among others (Akramkhanov, et. al., 2008). This tool is recommended to be used by larger organizations such as provincial departments of Hydro-Melliorative planning unit at MAWR (called *gosudarstvenniye gidromelliorativniye expeditcii*/state hydromelliorative expeditions SHME later in the paper) which has 13 provincial departments. These departments provide technical data from groundwater observation wells to the Hydromelliorative Department at MAWR. This department is responsible for calculating the amount of water needed for the agricultural production. This department works in close collaboration with SANIRI. The tool can also be used by MTPs (a local abbreviation, in English 'Machine and Tractors Leasing Centre') among others who provide technical assistance to farmers at places based on leasing contracts. This is because of its high price which is not affordable to an average farmer. The purpose of the use of this tool predefines its future path in the process of its diffusion. Namely the question is when or under which conditions this tool can be accepted into the planning of the above mentioned department, or introduced/ recommended to MTPs. In the time of my second round of field research from February to April 2011 all of the departments in MAWR were developing a National Modernisation Program for the years of 2012-2016.¹³

In the years of 2009-2010 the tool EM38 was tested by experts from SANIRI in order to obtain official testing results from a local research institute in form of an *akt* of testing (a certificate as a proof of appliance of the method in the real field conditions including recommendations for the innovation). On the last paragraph of the *akt* Shirokova (the chief of the laboratory at SANIRI) makes a recommendation regarding the future application of the tool which says that similar tests (calibration) should be repeated in more homogeneous soil where the ground waters did not so much effected the upper layers of the soil such as in Syrdarya province, and also in the type of soil such as in Fergana Valley. After this, she notes that the method can be outscaled and particularly used in the organizations such as SHME, WUAs (Water User Associations) and start training of the personal of these organizations. According to the authors of this innovation this testing has been performed already and no acts have been produced.

These *akts* can be submitted to RPC as a proof of some assessment which have been performed by members of local research institutes that can show that the tool functions under given conditions of soil. This then could determine further steps for the future diffusion of this innovation.

¹³ 3 expert interviews at MAWR, March 2011, Tashkent.

4.3 Innovation three: Conservation Agriculture

The Conservation Agriculture (CA) is another innovation of our project which is an introduction and adapting of the general concept of CA. CA is a “concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment” (FAO 2007). The main principles of this innovation is minimum/zero soil disturbance by tillage, retention of adequate levels of crop residues in the soil surface and appropriate crop rotations.

The first one, no tillage, is a very difficult to swallow for those who has not been used to this idea at all and for those to whom tillage and even more tillage has been a habitual agricultural practice, to use Bourdieu’s term. So to my mind this requires a lot of trainings, educational and informational activities not only among the farmers themselves but also among those who produce formal technical instructions in the format of *technologicheskaya karta*.

The second condition of this innovation is residue retention. There is a big demand for the residue by farmers since it is used as food basis for the cattle and therefore it is a big resource in farmers’ eyes. Considering poor conditions of rural population as well as farmers themselves it is difficult to talk about putting any limitations on the access of visible resources. By visible resources, I mean the profits that are tangible. Those benefits, which result after the calculation of end benefits from leaving the residue, are not tangible and rather abstract at least in the eyes of the farmers themselves. Of course it is arguable that with more educational, informational and other activities and extension services one could transfer these intangible resources into tangible ones or transfer knowledge into value (Erika Kraemer-Mbula and Watu Wamae 2010:42). Besides this there is a big need of improvement of food basis for cattle which of course comes with the consequent economic implications for the whole rural development scheme.

Another major issue in this innovation is the seeding-machine, which is part of the complex of the procedures of this innovation. It is imported from India and it is envisioned to be locally produced. For this machine to be locally produced one needs to get a permission to use it on a larger scale from a Uzbek Scientific Experimental Institute of Machines and Electro technology (SAUME is the local abbreviation) in agriculture which has an experimental station (SAMIS is the local abbreviation) of its own called Machines Testing Station in Yangiyul (Interview, Mechanization Department at MAWR, March 2011, Tashkent). After they tested this machine alongside with an overall assessment, they write a recommendation for its mass production in Uzbekistan. This document is then subject to approval by MAWR. Only then, one can make a contract with factories, which will be interested to produce. Then there is another question of financing this production arises unless the government will ‘fully’ accept the innovation and include into state national program, which will automatically take care of all the organizational, financial, legal and other conditions necessary for the implementation of the innovation.

5 Case study one: Introduction of Soya beans by AVRCD

The project on the development of a new crop variety (Soya bean) and its introduction in Uzbekistan was conducted within the frame of the State Programme under the title of “Development of highly effective methods and means, which fasten selection process, selecting and implementation of high quality, highly productive and precocious, resistant to sicknesses and extreme environment, crops of agricultural crops as well as effective methods to protect plants using modern scientific findings” and was coordinated by State Committee of Science and Technology (SCST) at the Cabinet of Ministers of the Republic of Uzbekistan. The project was submitted for funding by the Uzbek Research Institute of Plant Industry (UzRIPI) together with AVRDC World Vegetable Center in Uzbekistan to the SCST. There were also other researchers from Agrarian University included to the project. SCST’s approval of an innovation project is the first step in further formal acceptance of their future innovations by the state. The project preparation was coordinated by the Academy of Sciences, RPC at MAWR in order to make sure the originality of the project and its demand by the Republic needs. These criteria are necessary for future evaluation of the innovations produced as project results.

The project has been submitted under ‘the applied science with state number A-11-233 and title «Complex assessment of economically valuable properties of examples of Soya vegetable, selection of perspective crops to be submitted to state crop testing». In 2005 Soya was introduced within the frame of this project. After testing in the fields of the UzPIRI had been conducted, the new crop was submitted to SSTC. In 2007 SSTC decided to *rayonirovat’* (outscale) the crop. After this crop was included in the REESTR, it was given a passport with its own number. The document is called Certificate of the crop (*svidetel'stvo na sort*). The document contains author’s name(s) and their share in the development of the crop so that to secure the author rights.

The result of the project was a successful diffusion and outscaling of an adapted new crop variety of vegetable Soya bean (included into the REESTR). The assessment process in SSTC for this crop was relatively smooth and quick. The process of assessment by SSTC normally takes the following order for this kind of crop. Before documents submitted to the SSTC, there are several procedures necessary to be conducted during the year of submission. This includes testing of beans grown in the research institute fields with the participation of the experts from SSTC, which can be organized through official invitation letter, addressed to SSTC. This evaluation is then documented in the form of *akt*. In the process of application to SSTC, these *akts* are considered. After the submission of the beans to SSTC, the institute continued testing at their fields and parallel evaluations had been made. All the documents including the reports from the institute fields, *akts* and field reports of SSTC from all the provinces of Uzbekistan had been collected.

SSTC has its own test fields (thirty of them) in each province. These lands are called *GosCropUchastki* (State Crop Lands). These lands are further categorized as southern, eastern, central zones and are also characterized according to their qualitative parameters such as salinized, contaminated with mushrooms, poor water supplied, and soil with lower productivity and etc. These zones or categories define at the end the recommendations on the choice of provinces for outscaling a new crop.

Final decision to submit to SSTC is made by the Scientific Committee of the research institute. The protocol of this meeting is one of the main documents in the application package for SSTC. Only then, contact with a relevant specialist from SSTC is established to prepare the documents for submission. This expert provides with all forms and list of documents for the application. After all documents submitted to SSTC, the director signs an official agreement to accept them for the review process. Only after this letter of acceptance is issued, the evaluation can start. Furthermore, the expert at

SSTC decides on how much seeds are to be provided to SSTC and the terms of tests are also to be negotiated. The experimental test simultaneously continues in the research institute where experts from SSTC are also invited to make a control check in the most important periods of the plant. These checks are documented in form of *akts*. The seeds for SSTC should meet certain standards. There is also methodological manual to be provided for seeds by an author. The process of evaluation can take up to three years but in the case of Soya beans, the evaluation took one year to make a decision on its inclusion into the state REESTR. The decision was made on the basis of the field reports from all the provinces, and *akts* (results of assessments conducted at the institute's fields).

First, a crop under the evaluation should be found as promising (*perspektivniy*) in order to be included into REESTR the following year. The final decision is taken at the Ministry Collegium at MAWR where the chairman is at the same time the director of the SSTC. The protocol of this meeting serves as the basis for an official document of MAWR called *Buyruq* (Order) about the REESTR (usually at the end of each year). In this meeting it is decided which new crops are to be entered into REESTR, which are to be deleted and which ones are put under the category of *perspektivniy* ('promising' meaning this crop has a high potential to be entered into state REESTR the next year).

SSTC is a state funded organization and the evaluation processes of new crops for local national research institutes are state funded. However SSTC can also accept private or commercial entities and their crops for the evaluation on the contract basis and this also concerns international organizations. In case of soya beans, its *germoplasma* was provided by World Vegetable Center for SSTC and the application documents were submitted by a local research institute (UzRIPI) and therefore the evaluations have been state funded.

6 Case study two: x-express by SANIRI

The below described innovation introduced by SANIRI which is now widely used by state organizations, research institutes as well as by farmers, is similar to one of our project innovations EM38. The difference is that the tool of SANIRI is a laboratory method and EM38 is a method for larger scale coverage and is rather a field method of measuring salinity. This tool had been developed and was constantly advanced since 1994. Since then this method has been improved several times (calibrated). This method has been supported or even state-ordered on a contract basis by the hydromelliorative department of MAWR (HMD later) at MAWR. As an interviewee (Interviews at SANIRI, March 2011, Tashkent) said

First we developed this method, then we tested it, and then we did *vnedreniye* (implementation/outscaling) usually within three years, it takes normally three years for an innovation [to be outscaled], in reality we were given funds for one year, sometimes they prolonged [our contract], because each year plans were made by the scientific department at the ministry [MAWR]

The contracts were annually renewed but always under other names. In 1996 it was already "*vnedryalos*" (implemented/practically applied) in SHME (state hydromelliorative expeditions) which belongs to HMD of MAWR. In 1996 it was more advanced method than in 1994. Since 1994 there were trainings and seminars conducted by the members of the laboratory at SANIRI who were also part of the contract. In these seminars and trainings the members of SHME were taught how to use the express method to measure salinity. Scientific reports were submitted to a research department of the ministry together with the *akts* indicating the actual appliance of the tool by members of SHMEs.

In 1998-1999 the laboratory members won a grant from International donors such as WUFMAS foundation and Winrock International to get several types of salinity measurement tools as well as equipment for their laboratory. Within the project of WUFMAS there were several expensive tools brought to the laboratory to compare with their express method. The method was presented finally in 2000 in the Scientific Committee meeting at SANIRI. They got various feedbacks at this meeting. The members of this Committee included the director of *Uzgdrovodhoz* (Uzbek hydrologic water economy- state organization), head of *Uzsuvloiha* (Uzbek water project-state organization), and *proektniye* (planning) institutes. After this meeting the reports were sent to several research institutes (*GosKomZem*/State Committee of Soil, *Uzsuvloiha* and some other soil research experts) to get expert assessments. *GosKomZem* supported this method and also purchased one apparatus from SANIRI for their own use of salinity measurement.

When the express method was advanced and widely used by SHME members there was a question of developing a manual. In 2005 the methodology on the use of the tool in form of a brochure was developed by the author of the innovation together with the members¹⁴ of the laboratory participating in the project. It was submitted to the STAC¹⁵ (*Nauchno-Technicheskiy Sovet*/ Scientific Technological Advisory Committee at MAWR). STAC sent the brochure to RPC to get *otzyv* (assessment). RPC reviewed and gave their recommendations on the further improvement of the

14 There is a doctoral thesis is in the process of writing on this method by a member of the laboratory who is participating in the development of this method and who is also closely involved in the assistance of the trainings and seminars for the SHME members at district level.

15 STAC is an Advisory Committee at the MAWR, they approve official documents, reports.

style of writing, giving the guidelines how to rework it. Finally in 2007 the methodology on the tool was approved by STAC and is currently in use by the ministry as a standard procedure of the salinity measurement and melliorative planning.

The head of HMD asked the authors to prepare a normative document which would further serve as a standard guideline for salinity measurement and melliorative planning for MAWR. The author of the method together with other colleagues from the laboratory prepared this document in the format of a report. Afterwards it is subject to further development into a normative legal document which will serve as a regulated methodology for HDM at MAWR. The methodology stated the instructions on the use of the express method and additionally partial (20%) use of the classical method. The report was submitted in 2010 and after assessments had been collected and discussed, the document needed to be finalized, approved, accepted and put into force.

For mass production of any tool one has to get a patent stated an interviewee.¹⁶ To the question whether they got a patent she answered that the patent was requested by a producer of the tool and in their case the producer and the author were the same person. The author of the method grounded a private firm registered to produce the tool. Therefore, the contracts of the purchase of the tool are made through this private firm owned by the author himself.

¹⁶ Interviews, SANIRI, April, 2011, Tashkent.

7 Discussion and Conclusion

In this paper, I have described current situation of innovation policies and existing mechanisms for the diffusion of innovations in Uzbekistan. Examples of innovations' diffusion of our project innovations and of other projects showed that the mechanisms in form of systems are on the way to be established in the sphere of agricultural production and research. The empirical findings from analysing the path taken by the innovations described in this paper show individual character of each path taken by the innovations in question. This indicates that a complete infrastructure is on its way to be established for the diffusion of innovations. The institutional environment has a sporadic character which hinders decisions to be made for the future of innovations of both national and international projects. This was confirmed by the challenges the innovations faced in their way to be introduced, assessed and further diffused. However, there are some parts of these systems which have a more or less complete character namely introduction of a new crop variety. This is a well established system which initially has been created by the Soviet government since Uzbekistan was a main source for cotton production.

Theoretically, the existing institutional environment for the diffusion of innovations has been formulated by applying the framework that links innovation systems to development.

According to Edquist (1997), for innovation systems to be complete and functioning there should be three components in place, namely organizations (formal structures), institutions (sets of common habits, norms, routines) and linkages (interactions). If these components are not in place we talk about knowledge ecology (Foray 2010:97). Foray stated that innovation systems develop out of knowledge ecology. There is knowledge ecology which provides a good ground for developing innovation systems currently (in the time of the research 2010-2011) in Uzbekistan. One of the important conditions for knowledge ecology to be transformed or developed into interconnected innovation systems is that there is an absorptive capacity in places so that the new knowledge is accepted. This then results in the situation where knowledge is transformed into value which is an a priori condition for the above development to happen.

I have substantiated this argument by providing examples from innovation diffusion experiences of our project innovations as well as through analysis of the infrastructure which serves the basic functions for the development of the innovations. There is still a considerable empirical gap to be filled on the experiences of innovation development and their diffusion by both local and international projects in Uzbekistan. This gap needs to be filled, in order to have a well informed legislative establishment for the innovation systems in Uzbekistan. This information and research is necessary not only for the legislation development but also for informing political processes in this field.

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