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Uzbekistan's cotton clusters in the context of the industrial policy debate

Jakhongir Babadjanov[a,b] and Martin Petrick[a,c,d]

[a]Institute of Agricultural Policy and Market Research, Justus Liebig University Giessen, Giessen, Germany; [b]Department of Agricultural Economics, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers-National Research University (TIIAME-NRU), Tashkent, Uzbekistan; [c]Center for International Development and Environmental Research (ZEU), Justus Liebig University Giessen, Giessen, Germany; [d]Depatment of External Environment for Agriculture and Policy Analysis, Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Halle (Saale), Germany

ABSTRACT

In 2018, Uzbekistan initiated a clustering policy in the national cotton sector. Based on case studies, this paper investigates the recent changes in cotton production under the emerging clusters. Our findings show a mismatch between the meaning of clusters in the industrial policy literature and practice in Uzbekistan. The supervision of cotton growing passed from the state to private enterprises (clusters). This transformation has perpetuated monopsony conditions under which farmers have no alternative marketing channels. The input markets have been disconnected from state agencies, however farms lack access to private input markets, since clusters supervise the input use. Our analyses show that forced and child labor has receded. In general, the cluster reform hardly took into account the principles of industrial policy. For example, the establishment of clusters among farmers widely lacked transparency. Instead of a hastened establishment of clusters in large scales, an institutional environment that enables bottom-up initiatives should be promoted. Overall, from the farmers' perspective, recent reform steps led to moderate changes at best, while clusters started to play a dominant role in the cotton sector.

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Introduction

Three decades after the demise of Soviet planning, cotton remains a salient reform sector in Central Asia. It provides livelihoods and employment for a large fraction of the rural population and contributes to government revenue, but the consumption of irrigation water has also been responsible for the Aral Sea environmental disaster and harvesting campaigns have regularly prompted

CONTACT Jakhongir Babadjanov jakhongir.babadjanov@gmail.com Institute of Agricultural Policy and Market Research, Justus Liebig University Giessen, Giessen, Germany

allegations of forced labor. Cotton has thus been in the center of attention of policy makers, international donors, and advocacy groups (Asfaw 2019; Petrick et al. 2017; Pomfret 2008; Shtaltovna and Hornridge 2014).

As the biggest cotton producer in the region, Uzbekistan earned a reputation as an especially slow and opaque reformer (Asfaw 2021; Djanibekov et al. 2012; Lombardozzi 2020; Shtaltovna and Hornridge 2014). However, the change of government in 2016 accelerated the pace of reform, triggering a plethora of new policy initiatives, more open debate of reform proposals, and an increasing role of international donors. From early 2018, the government started implementing a new type of local production and processing arrangement focusing on cotton, the "cluster system". It thus chose a term that had gained prominence in the international debate on industrial policy two decades ago (Porter 1998) and that neighboring post-Soviet countries had also considered attractive for their own reform initiatives (see, e.g. Petrick et al. 2017 on Kazakhstan's experience). However, what exactly "cluster" means in the context of current cotton reforms in Uzbekistan and what effects should be expected to materialize in production practice has not yet been studied in the academic literature.

In the following, we explore the process of cluster formation in Uzbekistan's cotton sector and provide original evidence on the early effects of the new policy in selected cases. Industrial policy and the role of government in economic development have been important topics in the recent literature (Andreoni and Chang 2019; Chang 2006; Lall 2006; Rodrik 2007, 2009). Following Rodrik 2007, 2009), information and coordination externalities create an arena for the government to be engaged in incentivizing targeted sectors and activities. We frame our analysis within the recent debate on industrial policy, building on successful principles of good policy making derived by Rodrik (2009) and Andreoni and Chang (2019) that we present first. We agree with Andreoni (2016) that institutional settings are the basis for industrial policy diversity. In this sense, it is essential to understand the local context in which industrial policy is pursued. Thus we demonstrate how cotton clusters were established, and then investigate changes in cotton value chain inputs and services, credit, labor mobilization, crop choice, cotton price and marketing channels.

We present our own original case study data based on fieldwork conducted in four emerging clusters and expert interviews recorded in the second half of 2019, after the government had concluded the first round of cotton cluster creation. Our study includes primary data not only from cluster owners but also from farmers. In structuring the analysis of key reform areas, we review the evidence from secondary sources including "gray literature" (reports by government agencies or international organizations and news articles), in order to provide a comprehensive picture of reform progress to date. We use these sources to describe and evaluate the major changes that occurred between

early 2018 and mid-2020. While much of the gray literature focuses on specific issues, such as allegations of forced labor use or land grabbing, we aim at a more balanced and comprehensive evaluation.

The rest of the paper is set out as follows. The next section presents the theoretical concepts used in the study. Then the material and methods are given. Following that, research results along with discussion are provided. We describe recent policy developments and reform steps. We conclude by summarizing the current state of cotton growing under the cluster system.

Why and how governments pursue industrial policy through clusters

In the following, we reflect on two strands of literature providing theoretical perspectives on the definition of clusters and the role of government in promoting certain industrial sectors. We use these perspectives in the subsequent empirical sections to analyze and assess the actual cluster implementation in the cotton sector of Uzbekistan.

The definition of a "cluster"

Porter (1998, 2000) defines clusters as groups of interconnected firms, suppliers, related industries and specialized institutions in particular fields that are present in particular locations. According to Porter (1998), linkages and complementarities among companies delineate the boundaries of clusters. Wardhana, Ihle and Heijman (2020) provide characteristics of agricultural clusters as a) social and economic interactions between farmers; b) mutual relationship between farmers and related actors in agricultural production; c) linkages with supporting actors such as universities and the wider research community; and d) connections between farming activities and other sectors. However, the definition of a cluster itself is not straightforward. Porter (2000) himself admits that the definition of a cluster can differ by location and context, depending on the market segments in which actors compete with each other and the strategies which they practice. Brown (2000), Martin and Sunley (2003), Glăvan (2008), and Ketels (2003) show the ambiguity of the cluster concept due to the absence of a theoretical framework which may be used for practical applications. They argue that the term "cluster" implies neither a specific project nor any type of single organization. Nallari and Griffith (2013) highlight that clusters are not limited to one specific geographic zone but may cross regional or national boundaries. Yamawaki (2002), Menzel and Fornahl (2010), and Abbasiharofteh (2020) explore the evolution of clusters and show potential drivers that trigger cluster formation. Porter (1998), Rosenfeld (1997), and Wardhana, Ihle and Heijman (2020) discuss the role of clusters as drivers for regional economic development.

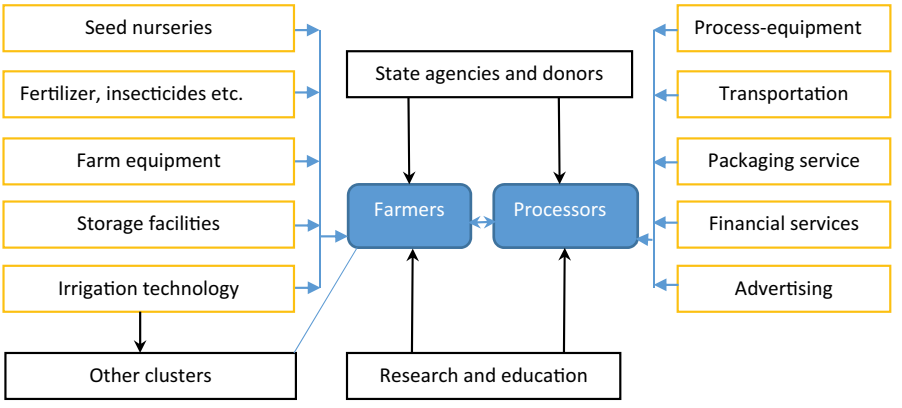

Figure 1. An agricultural cluster as a combination of various actors. Source: authors based on Shakya (2009)

In Figure 1 we present a schematic concept for the structure of agricultural clusters based on Shakya (2009). Here, the cluster operates as a system of interconnected firms: farmers, fertilizer providers, processors, and other stakeholders. The proximity in the location and activities of these actors provides benefits such as access to specialized human resources and suppliers or the close interaction between growers and processors (Shakya 2009). Actors in clusters are independent with regards to decision making, a point which can be illustrated by looking at farm equipment. The suppliers of such equipment are not necessarily subsidiaries of farmers or processors. They are independent economic actors working together based on mutual interests and benefit. There is a competition among farm equipment suppliers, so farmers may choose the most beneficial offer.

Despite the range of interpretations, the literature widely agrees on a set of core characteristics of clusters: their potential economic strength is due to the geographic aggregation of several enterprises, possibly smaller and bigger and active in different stages of the value chain. It is the interplay among these enterprises, possibly on a competitive basis, that sets the conditions for innovation, individual firm growth and further expansion of the cluster as a regional development engine. So what then is the role of government in coordinating economic activity, such as through the creation of clusters?

The government's role in clusters

Nallari and Griffith (2013) stress that the government plays a vital role in providing a regulatory environment for the businesses in the clusters. Moreover, government policies influence the education and research activities, which are combined with other actors in clusters. Porter (2000) and Ketels (2003) highlight several roles for government in cluster-

based development, such as a) ensuring political stability, b) developing an educated workforce and physical infrastructure, c) establishing incentives governing competition that encourage productivity growth, d) developing long term action plans, and e) facilitating cluster development and upgrading it. Furthermore, Porter (2000) highlights that governments should support established or emerging clusters rather than creating new ones, because new clusters tend to emerge from established ones as economies develop.

Clusters and industrial policy

Glăvan (2008), and Pack and Saggi (2006) highlight that the cluster approach is a particular form of organization in the frame of industrial policy. Nathan and Overman (2013) focus on government policies and clusters, referring to clusters as one type of industrial policy, for example, targeting specific sectors such as tourism or biotechnology (Rodrik 2007). Following Pack and Saggi (2006), and Nathan and Overman (2013), industrial policy refers to any type of selective government intervention in favor of certain sectors. Chang (2006) defines industrial policy "as a policy aimed at affecting particular industries to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole".

According to Rodrik (2007, 104–109), the major justifications for these kinds of government intervention in industrial development concern two types of market failure: information and coordination externalities. In the first case, diversifying entrepreneurs must discover the cost structure of their new activities as they go along. They experiment and investigate new production lines. If they are successful, possible imitators appear and the rent for the original entrepreneur decreases. If they fail, the entrepreneur bears all the costs. Under these scenarios, the role of government is to subsidize or fund entrepreneurs that are involved in the self-discovery process. In the second case, project implementation requires other complementary investments or infrastructure. Any entrepreneur considers local conditions before starting a new activity, for example access to roads, electricity, lab services, exporting markets and so on. Government should provide complementary infrastructure that supports the entrepreneur.

Andreoni and Chang (2019) point out that industrial policy is not about a single sector or institution in isolation, rather the approach should embrace the whole package of designs, implementation, and strategic coordination which support the targeted sector. According to the infant industry argument (that is at the core of industrial policy), a country needs to defend industries in their early stages from external competitors, in the same way as parents protect children before adult age (Pack and Saggi 2006; Andreoni and Chang 2019). In this sense, we assume that the reform with regard to the cotton clusters in

Uzbekistan is one example of an industrial policy approach, since the central government was directly involved in organizing cotton clusters.

Success principles of industrial policy

Breaking the grip of central planning raised a fundamental question about the role of government in its successor arrangement, the "market economy". Current interventionism in economic policy clearly sees a coordinating and active role for the government that goes beyond the mere establishment of a functioning market system (Rodrik 2009). Market imperfections due to information asymmetries in capital and labor markets as well as in provision of public goods provide the economic justification. But governments also widely engage in the promotion of certain industrial sectors through "promotional activities" such as science parks, export facilitation, promotion of foreign investment, and free-trade zones. According to Rodrik (2009), the question to ask is thus not why, but rather how to design an industrial policy that provides maximum benefits for the domestic economy. Lall (2006) also underlines that development outcomes do not depend on whether governments intervene, but on how they devise and implement industrial strategies.

Rodrik (2009) emphasizes three attributes of successful industrial policies: embeddedness, carrot and sticks, and accountability. Embeddedness refers to the close collaboration between the government and the private sector. The government (as the principal) designs the rules and the private sector (the agent) performs based on those rules. The government often has only obscure ideas of the activities, instruments and behavior of the private sector. That is why it requires embeddedness, i.e. the intensive collaboration and information exchange between the government and the private sector to make appropriate decisions, learn from experience and to correct mistakes. These focused interactions decrease the information asymmetry which may arise between parties, for example, councils, development forums, sectoral round tables, discussions and associations facilitate interaction between the state and private sectors. Through the "carrot and stick approach", governments incentivize firms (e.g. by providing subsidies), monitor their performance based on certain criteria (i.e. export volume, investment duty, job creation) and raise concerns if they fail. This may happen through the discipline of the market. In any case, it is of vital importance to be explicit about the criteria by which the industrial policy program will be judged. Accountability must work both ways: bureaucrats monitor the private sector, which monitors the bureaucrats. One of the fundamental mechanisms of accountability is transparency. The decision-making process, activities within industrial policy, events and other related information should be transparent to the public since the public is considered the ultimate principal.

Meanwhile, Andreoni and Chang (2019) are concerned about the current debates of industrial policy and highlight three classic problems which they claim have been lost in recent industrial policy approaches: coordination of structural interdependencies, building institutions, and managing conflicting interests. First, the economic system embraces several sectors connected by structural interdependencies at different stages of aggregation. During structural transformation, these interdependencies may not be allocated proportionally across sectors and production processes. In other words, different parts of the system change at different rates. Furthermore, the development of one sector (i.e. production) is limited by other sectors (i.e. lack of sufficient demand). This situation creates structural tensions that continuously form barriers to production within and across sectors. Therefore, there is a need for strategic coordination by governmental agencies. Second, the government is required to set up various institutions (e.g. a property rights regime) and deploy various policy alignments with regards to strategic coordination of structural interdependencies (Andreoni and Chang 2019). Thus, the mere existence of institutions is insufficient, they must be built and connected in a coherent manner. Third, industrial policy evolves within the political economy, in which different actors or groups promote their interests (Andreoni and Chang 2019). Involving different actors such as landowners, service providers, farmers, processors and others shows to what extent their interests are included in industrial policy reform. In this sense, policymakers play a vital role in solving conflicting interests and organize them around a clear development vision.

Looking back, all Central Asian economies maintained a strong central control of economic activity after political independence. In Uzbekistan, that certainly applies to the agricultural sector (Pomfret 2008; Zorya, Djanibekov, and Petrick 2019). This control often seemed to be guided more by rent extraction and bureaucratic overregulation than by the active promotion of innovative entrepreneurship and the provision of complementary public goods. In the following, building on the above theoretical analysis, we describe the structure and function of clusters in Uzbekistan and how these have changed cotton value chains in terms of inputs and services, credit, labor mobilization, crop choice, cotton price and marketing channels.

Empirical methodology

Case study approach

Cotton production under the emerging cluster system is complex and context specific, which requires an inductive analysis. According to Kumar (2018), the case study approach is helpful when investigating an area in which little is known, as is the case here where the government introduces a new policy approach. We take a cluster (enterprise) as a case unit that means one cluster is

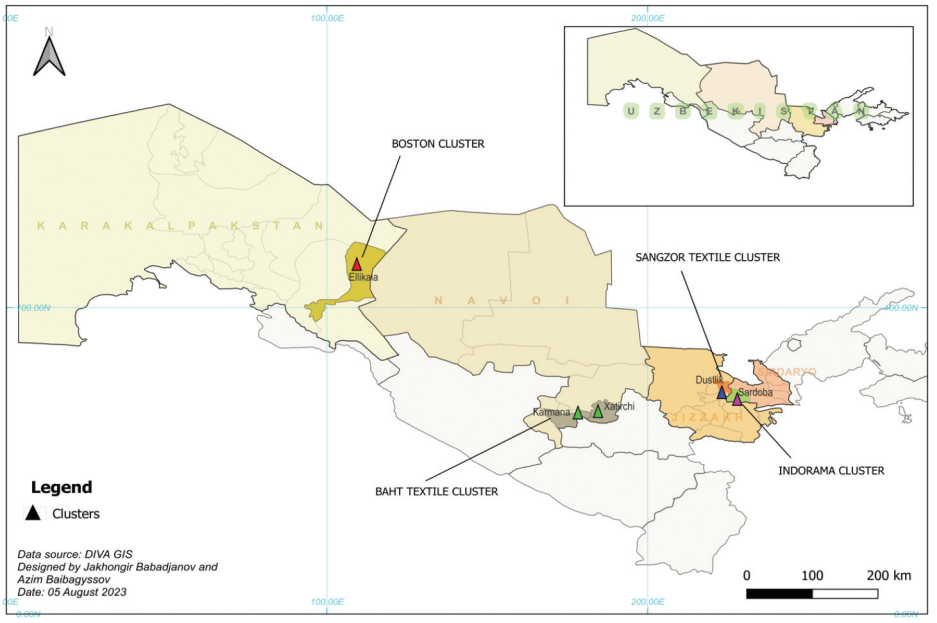

Figure 2. Sites of clusters in Uzbekistan covered by this study. Source: authors.

one case. One of the advantages of a case study is that the researcher generates detailed results, however, the difficulty in aggregation of the findings is a disadvantage. Since clusters have been established in different provinces of Uzbekistan, covering all clusters was impossible due to lack of time and finance. We therefore chose cases that are typical and particularly instructive examples, whilst covering different regions of the country (following guidance in Flick 2018, 108 and Yin 2003, 12). This takes into account the varying conditions in the cases and helps to generalize the findings for the country. Kumar (2018) suggests to select cases based on purposive or information-oriented sampling. Therefore, we selected four "clusters" from various locations to study as "cases" (Figure 2), thus using a descriptive case study with multiple cases (Yin 2003, 5). Our sampling of cases draws on the list of the cotton clusters provided in governmental resolutions (Resolutions of Cabinet Ministers (RCM) No 53 from 25.01.2018 and No 230 from 18.03.2019; 77 clusters in total). Given our financial and time resources, we picked four clusters for further study. We attempted to cover different regions and contractual arrangements in a purposive sampling procedure. We also wanted to cover one of the pioneers in clustering.

Study sites

Table 1 lists the four cases. They are located in various parts of Uzbekistan, representing different stages of development (being established between 2017 and 2019). Baht textile cluster represents a pioneer of clusterization policy. The

Table 1. Overview of cases.

Name	Province	Year	Land, ha	Contractual arrangement	Farmers included
Bo'ston cluster	Karakalpakstan	2018	10 764	Contract farming	223
Baht textile cluster	Navoiy	2017	8 400	Contract farming	585
Sangzor textile cluster	Jizzakh	2019	11000	Contract farming	648
Indorama cluster	Syrdarya	2019	6000	Direct farming	-

Source: authors.

Table 2. List of interview partners.

No	Interview partners
I1	Deputy Manager (Bo'ston cluster)
I2	Farmer (Bo'ston cluster)
I3	Specialist of local administration (Bo'ston cluster)
I4	Manager (Baht textile cluster)
I5	Specialist (Baht textile cluster)
I6	Specialist of local administration (Baht textile cluster)
I7	Specialist (Sangzor textile cluster)
I8	Farmer (Sangzor textile cluster)
I9	MTP head (Sangzor textile cluster)
I10	Specialist (Indorama cluster)
I11	Specialist of local administration (Indorama cluster)
I12	Farmer working in old system
I13	Specialist (Council of Farmers)
I14	World Bank expert in Tashkent
I15	Researcher from Tashkent State Agrarian University
I16	FAO expert in Tashkent
I17	Specialist of Ministry of Agriculture
I18	Specialist of State Support Fund of Agriculture
I19	Specialist of cotton-textile clusters association of Uzbekistan
I20	Specialist of Ministry of Agriculture

Source: authors.

land area covers between 6000 ha and 11,000 ha, respectively. The cases represent contract farming and direct farming practices, to be explained below. Bo'ston cluster, Baht textile cluster and Sangzor textile cluster had concluded contracts with 223, 585 and 648 farmers correspondingly.

Primary data sources

Following Yin (2014), we used a range of sources: documents (i.e. announcements, formal evaluations, and reports), open-ended interviews, and field observations. The case reports were aggregated to provide a general overview of research findings.

The first author conducted open-ended interviews with key actors including farmers, staff of cotton clusters and Council of Farmers, and heads of Machine Tractor Parks (MTPs). Furthermore, interviews were extended to specialists of the Ministry of Agriculture, local authorities, representatives of the State Support Fund of Agriculture (the Fund), donor organizations (World Bank and the Food and Agricultural Organisation (FAO), and university researchers (Table 2). We cite the interviews in the text by indicating "I1, I2, ... I##".

The first author collected the empirical data including interviews and field visits to case-clusters between May and November 2019. Also, during the cotton harvest of 2019, he engaged in participatory observation to observe the cotton harvest. In addition, he continued interviews in 2021 and 2022 years with relative actors.

Secondary sources

We complement our case studies with a systematic review of "grey literature", referring to reports from international organizations, private stakeholders and news reports (Table 3). We briefly describe the key reports as follows. ILO (2019) conducted a rapid assessment of clusters established in 2018 and derived recommendations for reforms in the cotton sector. That study built on qualitative analysis, but primary data from farmers was not gathered. Zorya and Babaev (2020) provide a recent review of cotton cluster policy, based on official government resolutions and stakeholder consultations. Synovitz and Ashur (2019), correspondents of Radio Free Europe/Radio Liberty (RFE/RE), describe the cotton cluster approach in Uzbekistan. Their investigation builds on interviews with farmers affected by the clusters, academic researchers and regional officials. Lasslett (2020) analyses the improper governance risk as example of 20 cotton clusters in the series Power Brief of Ulster University. The report employs information from corporate registries, stock exchange filings, and legal databases available in Uzbekistan, Russia, Switzerland, Singapore, Thailand, and the United Kingdom. Asfaw (2019) looks at cotton reforms and the introduction of cotton clusters in a policy brief of Westminster University in Tashkent, based on interviews with stakeholders. Yusupov (2019) reviews the cotton sector, employing official statistics and findings from research projects to highlight key problems and reform priorities. Srokina (2020) reports on environmental and social impacts of establishing the Indorama cluster to attract international investment.

The document comprises desktop study of secondary sources, site visits to Kashkadarya and Syrdarya regions, and interviews with relevant actors including farmers. Schweisfurth (2021) is a news article on land grabs and includes six cotton clusters. The story consists of data from governmental resolutions, various websites, the Uzbek Forum for Human Rights and other sources. Cotton Campaign (2021) reports on the decline of forced labor in the 2020 cotton harvest using data collected by experienced monitors of the Uzbek Forum for Human rights across six regions. Asfaw (2021), published in an academic journal, investigates the liberalization and privatization process under clusters and its early effects. The review paper draws mainly on WB and ILO reports, governmental resolutions, websites, along with some key informant interviews. Most of these reports focus on single topics and some follow a clear political agenda. We place them in a broader context in the following.

Table 3. Grey literature on cotton reforms in Uzbekistan after 2018.

No	Authors	Year	Publication type	Data sources	Objectives	Sources
1	ILO	2019	Donor report	Visits to seven clusters, qualitative analysis	Rapid assessment of current cluster performance, recommendations for further reforms in the cotton sector	https://www.ilo.org/ipec/Informationresources/WCMS_681372/lang–en/index.htm
2	Synovitz and Ashur	2019	News report	Interviews with farmers, researchers and regional officials	Raise awareness for the situation of farmers and negative impacts of current clusters	https://www.rferl.org/a/uzbek-farmers-get-cluster-bombed-by-reforms/30328781.html
3	Yusupov	2019	News article	Official governmental data, research discussion paper, and several project reports	Review of agriculture, key problems and the need for reforms	https://cabar.asia/en/the-agricultural-sector-of-uzbekistan-features-key-problems-the-need-for-reforms.
4	Asfaw	2019	Policy Brief	Interviews with stakeholders and data from official governmental resolutions	Review of cotton industry reforms and implications of textile cluster formation	http://cpro.wiut.uz/pb-2019–04
5	Zorya and Babaev	2020	Donor report	Official governmental resolutions, stakeholder consultations, data from Uztextile association	Review the progress achieved by cotton-textile clusters, discussion of their current and future role	https://documents1.worldbank.org/curated/en/305731601271791257/pdf/Policy-Dialogue-on-Agriculture-Modernization-in-Uzbekistan-Cotton-Textile-Clusters-in-Uzbekistan-Status-and-Outlook.pdf
6	Srokina	2020	Consultation report	Interviews with relevant actors and field visits	Environmental and Social Impact Assessment (ESIA) for the cotton farming project of Indorama cluster	https://www.indorama-agro.com/ESIA-disclosure/FE%20INDORAMA%20AGRO%20LLC_Volume%20II_Final%20ESIA%20Report_Eng_16-Dec-2020.pdf
7	Lasslett	2020	Research Brief	Open legal data bases, various websites	Analyse risks of clusters using corporate integrity scorecard (green, amber, red)	https://pure.ulster.ac.uk/en/publications/out-of-the-cauldron-into-the-fire-risk-and-privatisation-of-uzbek

(*Continued*)

Table 3. (Continued).

No	Authors	Year	Publication type	Data sources	Objectives	Sources
8	Schweisfurth	2021	News article	Official governmental resolutions, various websites (Telegram channel, YouTube etc.), Uzbek Forum for Human Rights and other sources	Investigate land-grabs by clusters and their effects on rural livelihoods	https://apparelinsider.com/land-grabs-the-new-red-flag-for-uzbek-cotton-sector/
9	Cotton Campaign	2021	News article	Field visits during cotton harvest 2020, interviews	Labour use monitoring during cotton harvest 2020	http://www.cottoncampaign.org/a-changing-landscape-in-uzbek-cotton-production.html

Source: authors.

Table 4. Rise of clusters over years.

Indicators	2018	2019	2020	2021	2022
Number of clusters	13	77	97	122	134
Land area, thousand ha	140	668	917	1034	1034
Number of farms	-	20981	25150	28206	28206
Seed cotton, thousand tons	-	1800	2700	3400	3600
Fiber, thousand tons	-	294.7	421	862.1	862.1

Source: authors based on data of Ministry of Agriculture and agro.uz, 2021.

The nature of cotton clusters in Uzbekistan

The establishment of clusters

In 2017, the new government started massive reforms in many directions, which included the privatization of cotton production (Asfaw 2021). The government liquidated the state cotton agency (Uzpahtasanoat) and announced the cluster approach,[1] it established 13 cotton clusters in 2018, and by 2022 their number had reached 134 (Table 4). "The main objectives of organizing clusters are to reduce the role of the government in cotton production, create jobs, and position Uzbekistan as an exporter of textiles and garments rather than raw cotton" (ILO 2019, 76).

Asfaw (2019) argues that attracting foreign investments was a major goal of the cluster policy. The manager of Baht textile cluster (I4) illustrates the change of attitude on the side of the government:

> After organizing a textile firm in 2006, we wanted to establish cluster system that time. However, we could not get permission from the government and Uzpahtasanoat (state agency) was against it. In 2017, during the visit of President to the region, we presented

> the project i.e. establishing cluster, processing cotton, export and job places, and we got permission. (August 12, 2019)

Starting in 2018, the government set up the clusters following a top-down approach through formal resolutions (Table 5).

Our other case study clusters were established as a result of these resolutions. A governmental resolution provided the list of clusters to establish and the area of cotton to be planted in each. The existing gins were sold to the clusters based on subsequent resolutions (I1, I4, I7, I10, I16). Textile firms initiate the establishment of clusters by submitting an investment proposal to provincial authorities (khokimiyats). Then, khokimiyats review the proposals and send the list of applicants to Uztextileassociation, an organization representing textile firms. Uztextileassociation reviews applications according to criteria such as investment potential, processing capacity, jobs to be created and others. Then, it prepares the documents necessary for adoption of a governmental resolution. The final decision is made by the Cabinet of Ministers by adopting the corresponding resolutions (Zorya and Babaev 2020, I17).

Mainly, districts and sub districts were taken as boundaries of clusters. In 2017, Baht textile cluster was set up as a pilot project in Qiziltepa district of Navoiy province (ILO 2019) and covered all farmers in the district. In 2018, the government broadened the cluster policy by adopting Resolution No. 53 of 25 January 2018 in which 13 clusters were established and the assets of Uzpahtasanoat in those districts were sold to the clusters. The textile firms established a new sort of legal enterprise – the "cotton cluster". They privatized the semi-state ginneries and integrated them into the new company as a part of the cluster (Figure 3). Hence, cluster refers to a certain type of "enterprise" that

Table 5. Major policy events on cotton clusters in Uzbekistan.

No	Policy event	Main objective
1	Resolution of Cabinet Ministers No 53 from 25.01.2018	Create 13 cotton clusters
2	Presidential Decree No 3574 from 28.02.2018	Payment for harvest till the end of each year
3	Resolution of Cabinet Ministers No 253 from 31.03.2018	Transferring (selling) gins to clusters
4	Resolution of Cabinet Ministers No 744 from 19.09.2018	Create 44 new cotton clusters in 2019
5	Resolution of Cabinet Ministers No 230 from 18.03.2019	Create 17 new cotton clusters
6	Resolution of Cabinet Ministers No 914 from 18.11.2019	Create 14 new cotton clusters in 2020
7	Resolution of Cabinet Ministers No 397 from 22.06.2020	Create cluster association and evaluate clusters
8	Presidential Resolution No 5009 from 26.02. 2021	Up to three clusters can operate in one district
9	Presidential Decree No 14 from 16.11. 2021	Create a commission for the establishment and support of clusters
10	Resolution of Cabinet Ministers No 733 from 04.12.2021	Rules for establishment of clusters and agreement with clusters

Source: authors based on lex.uz.

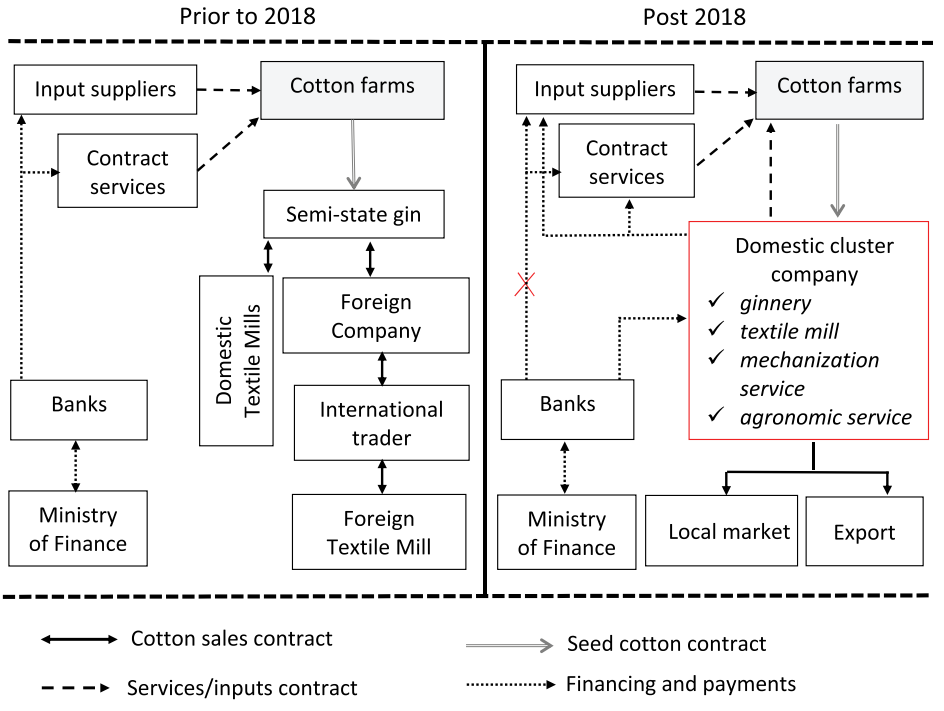

Figure 3. Cotton supply chain before and after 2018. Source: authors based on Sadler (2006), Rudenko et al. (2013), Djanibekov and Finger (2018).

owns at least a ginnery and a textile mill with a sole manager. From our interviews (I1, I4) it becomes clear that clusters are private firms and cluster owners are business people. They are not affiliated with state agencies. Clusters hire key personnel like agronomists, machine operators and irrigators to provide mechanization, agronomic and other services.[2]

Clusters are members of the cotton-textile clusters association that was established based on RCM No 397 of 22 June 2020. The activity of this association is described by one of its employees its specialist as follows (I19):

> Main objective is to protect the interests of cluster companies. The association is nowadays trying to obtain tax exemptions, export support or subsidized loans to its members. All cotton clusters are members of the association. If there is a misunderstanding between a farmer and a cluster, or the state and a cluster, the association is involved to tackle this issue. The association is a non-governmental organization and its budget is composed of membership fee and other sponsors payments. Membership fee is paid yearly. (August 25, 2021)

According to ILO (2019, 76), the term "cluster" describes "a transaction whereby the government allocates a defined geographical area to a private investor who in return commits to growing cotton and to establishing processing facilities in that area".

The government resolutions determined the boundaries of clusters, and farmers living within those areas did not have a choice whether to join the cluster or not. During the implementation process, transparency and accountability to the farmers was widely lacking (Asfaw 2021; Zorya and Babaev 2020). As a results, the field study showed that the uncertainty among farmers about future farming loomed large (I2, I15). Interviews with a farmer of Bo'ston cluster (I2) reveal that in practice the farming activity is uncertain due to cluster policy:

> The cluster system provided more supervisors over farms to control than before. We work in the field, they just come and control or order us to do something, and they do not care about the future of farming. Everyone tries to control farms here. The cluster does not pay more than the governmental minimum price. Land should be private. We do not want to invest in land improvements. Because we do not know what would be tomorrow. (July 10, 2019)

Types of clusters in Uzbekistan

ILO (2019) and Asfaw (2021) distinguish two types of cluster by their contractual arrangement with farmers – either contract or direct farming. This is not the only way to categorize clusters, but we follow it here due to its substantial impact on the decision making of farmers. Contract farming clusters conclude agreements with farmers who remain autonomous. These farmers grow cotton according to the contract and deliver it to clusters. The clusters process the raw cotton as downstream business. Under direct farming, clusters receive the land from the state based on a lease-agreement. The clusters grow cotton by themselves as a vertically integrated business. Direct farming clusters hire workers to grow cotton (Resolutions in Appendix; ILO 2019; Zorya and Babaev 2020).

In case of direct farming, clusters may tacitly seize the land use rights held by the incumbent farmers (ILO 2019). In the Indorama case, the state gave the land to the Indorama cluster for up to 49 years with an option for extension. More than 100 farmers lost their land area and previous occupation as an independent farmer (I10, I11). Srokina (2020, 7) reports that farmers who had their farming activity terminated were offered jobs by the Indorama cluster and approximately 45% out of total decided to join the cluster as workers. According to the RCM No 22 from 31 January 2013, in case of farm termination, any investment and land improvement costs have to be reimbursed by the organization receiving this land. According to Srokina (2020, 20), as all farmers terminated the land-lease contracts voluntarily, an obligation to compensate did not arise. Schweisfurth (2021) argues that land lease termination of farms was involuntary, even though clusters and local khokimiyat officials labeled it as a voluntary. The author also highlights the apparent hardship

of rural communities in renting small plots, cultivating fruit and vegetables and grazing livestock due to direct farming clusters. Our primary data does not allow us to conclude whether the land lease termination was voluntarily or not, and what those farmers are currently doing.

Following Ketels (2003), we also categorize cotton clusters based on whether the investor's origin is local or foreign. We checked open-source websites such as stat.uz and www.indorama-agro.com to derive information about shareholders. Based on that and field visits, we can classify Bo'ston cluster, Baht textile cluster, and Sangzor textile cluster as local. These three clusters are run by local business people, while Indorama Holdings BV (The Netherlands) is a foreign investor in the Indorama cluster. More specifically, Indorama Corporation Pte. Ltd (Singapore), which is an associate of Indorama Holdings BV, organized the cotton cluster in Uzbekistan. Therefore, it is common among local people to call Indorama cluster a "Singapore company". Attempting to identify the investors in all current 134 cotton clusters was too time consuming and therefore we conducted an interview with a relevant specialist of the Ministry of Agriculture in order to obtain an overview of the situation (I20):

> Around 10% of 134 clusters have a portion of foreign direct investments. Investors are from the US, UK, Singapore, Russia and so on. Other clusters were established by local investors. (September 19, 2022)

The nature of cotton clusters

Our empirical analysis elucidates the striking differences between the definitions of the cluster in the economic literature on the one hand and the implementation in Uzbekistan on the other. Table 6 below recaps the major differences of the cluster approach in theory and in Uzbekistan.

First, the main difference is about the participation structure within the cluster. The cluster definition in the literature refers to a group of interconnected independent economic actors in a particular location (Ketels 2003; Porter 1998, 2000; Shakya 2009), while in Uzbekistan, a cluster is a single company (Figure 3). Secondly, the boundaries of clusters may cross administrative borders (Abbasiharofteh 2020; Ketels 2003; Porter 1998, 2000; Rosenfeld 1997), however our case clusters are just based on territories of districts and sub districts. Third, the cluster members are free to join and exit theoretically, while in Uzbekistan, the clusterization process failed to provide farmers with this choice. Finally, cluster policy in Uzbekistan represents a top-down approach, while international experts and literature advocate for bottom-up initiatives to make the policy successful.

Under the current design of the cluster system in Uzbekistan, farmers may not endeavor to increase productivity and clusters do not provide

incentives to farmers owing to the absence of competition. The experience of neighboring Kazakhstan with cluster policies shows that regulation over the heads of local stakeholders can fail (Petrick et al. 2017). Glăvan (2008) also clearly highlights that cluster formation enhances productivity only if it evolves naturally from voluntary engagements. Moreover, accountability and considerations of various stakeholders lacked in the process which were significant elements of industrial policy. Both competitive public tenders and transparency were lacking. The authorities should make public information about the owners of the cluster; whether they are local or foreign investors; when operations started; where contact details can be found; how many workers are hired, etc. Synovitz and Ashur (2019) criticize the lack of accountability of clusters to farmers by pointing out that cotton farmers even could not find an office building or the address of the corresponding cluster organization. This was a clear example of the need for accountability and inclusion of farmers, as mentioned by Rodrik (2009), and Andreoni and Chang (2019).

Reform effects along the cotton value chain

Table 7 compares the situation before and after the introduction of clusters in Uzbekistan. We find that clusters replaced several roles of the state in management, but changes for farmers from the production perspective were minimal.

Inputs and services

Since independence, inputs have been provided by a centralized system through state programs (Djanibekov and Finger 2018; Lombardozzi 2020; Sadler 2006). The Joint Stock Company (JSC) Uzagrokimyohimoya provides fertilizers and pesticides. In addition, this company exercises a government mandate to combat locust, pests and plant diseases (Uzagrokimyohimoya.uz 2020). However, after the introduction of clusters, JSC Uzagrokimyohimoya lost its dominant position in input provision. At the time of fieldwork, some branches had already been closed due to a lack of demand (I1, I3, I13). Now clusters may purchase inputs from local private companies or import from abroad (ILO 2019). JSC Uzbekneftegaz branches provide farmers with fuel. This company implements the government policy on fuel and gas resources in practice. It involves more than 50 enterprises, including 13 foreign joint-ventures and local enterprises. 99.9% of shares of Uzbekneftegaz belong to the government, and foreign investors and locals own the rest of the share (Ung.uz 2020). Farmers receive diesel based on the price determined at Uzbek commodity exchange at the time the clusters purchase. The Ministry of Agriculture controls the cotton seed production and distribution. The first author interviewed a specialist of Sangzor textile cluster regarding input supply:

> Inputs for farmers were provided without any problem on time such as spare parts for equipment, fuels, fertilizers, salary to the workers. Also, fertilizers like nitrogen, phosphate and others were imported from Kazakhstan and farmers used them. (August 24, 2019)

A farmer of Sangzor textile cluster added (I8):

> We are receiving inputs on time, no problem. We will cover all costs from cotton harvest. If we cannot fulfil plans, it is going to be a problem for us. We will see what will happen. We do not have a clear idea how we work with the cluster yet. We have our plan for cotton production and we are trying to fulfil that plan. We receive the price that was guaranteed by the government. (August 24, 2019)

When the first author asked the specialist of Sangzor textile cluster (I7) why they did not use local fertilizers, he stressed that the quality of imported fertilizers was better, but the price was also a bit higher. The same situation prevails in Baht textile cluster, which also imported some fertilizers from Kazakhstan and sold it to farmers (I4, I5). ILO (2019) supports this by reporting that some clusters imported phosphate and other fertilizers since they considered the quality of local fertilizers as low. Indorama cluster invested in a fertilizer production plant in Fergana province to supply cotton with own fertilizers (I10) (Table 7). These empirical findings indicate a positive trend of input market liberalization due to the cluster policy. The clusters now decide autonomously which inputs, such as fertilizers and crop protection, to purchase and from where. In this sense, the role of state agencies in input provision decreased. The input market liberalization could be an example of the "carrot" attribute (Rodrik 2009), which is an incentive for cluster formation.

As we observed, MTPs are poorly functioning and farmers (I8, I12) complain about the quality of mechanization services. Several MTPs are expected to be sold to private companies including clusters. Bo'ston cluster is going to buy Ellikkala MTP. However, the manager of Baht textile cluster mentioned that they were not willing to provide MTP services (I1, I4). The MTP head in the territory of Sangzor textile cluster remarked that their MTP would not be sold and it would continue operating (I9). Indorama textile cluster purchased John Deere agricultural machinery to provide mechanization services (I10, I11).

Responsibilities of stakeholders shifted after the establishment of clusters. Importantly, the cotton-textile clusters association creates an arena in which state and clusters cooperate regularly. These interactions may enable identification of potential bottlenecks, design of measures for improvement, and learning from the mistakes. One potential example of bottlenecks is the agreement between the cluster and farmers on cotton delivery. What are the responsibilities and rights of each party? In such a case, clusterization may mitigate the information asymmetry among farmers, clusters and other actors. These are some forms of embeddedness mentioned by Rodrik (2009) and strategic coordination through institutions highlighted by Andreoni and Chang (2019).

Credit

The Fund under Ministry of Finance directs the credit to the joint stock commercial Agrobank for further allocation to cotton farmers.[1] However, as argued by Djanibekov et al. (2010), Shtaltovna and Hornridge (2014), MacDonald (2012), and Rudenko, Lamers and Grote (2009), farmers cannot control the extended loans because of specific targets (Table 7). According to Shtaltovna and Hornridge (2014), farmers should direct the loans in the ways they choose and have access to their bank accounts to invest in the farm further. After establishing clusters, the procedure changed and clusters started to receive the subsidized loans. The first author interviewed a specialist of the Fund (I18):

> At present about 30% of cotton is grown by farms in the old system. Their account is in commercial Agro bank. Our Fund transfers money to the Agro bank directly to provide farmers with loans. Newly established clusters grow roughly 70% of cotton. Their account is not only in the Agro bank but also in other banks like Asaka or Orient Finance Bank. The Fund directs the loans to these banks of clusters (not to farmers) to use. Then, clusters transfer money to input providers or farmers based on needs and schedule. (July 20, 2019)

Regarding loans, the deputy manager of Bo'ston cluster mentioned that they transfer money to Agro banks to provide farm staff with salaries. However, for other services and inputs, the cluster directly transfers money to the providers (I1). This is the same in Baht textile cluster and Sangzor textile cluster as well (I4, I7). There might be challenge if a farmer fails to fulfill the plan and cannot pay the interest costs occurred. The similar case is described by the farmer (I2):

> My farm was established in 1996, one of first farms. I could not fulfil the plan of cotton growing last season (2018) for 12 million sum (around 1500 dollars). The factors like unfavorable seasonal condition and lack of water resources led to low harvest. As a result I had to find money to pay debts including loan interests. I was required to ask for financial help from relatives and I also sold some livestock for example cattle and sheep. (July 11, 2019)

ILO (2019) reports that some clusters attracted loans from commercial banks based on general terms. Since a cluster is an "enterprise" in Uzbekistan, loans from commercial banks are available with higher interest rate (around 20%) than subsidized loans (5%), but collateral is required.

As we have seen, Uzbekistan has retained the traditional model of state funding due to its still unreformed banking sector. ILO (2019) highlights the insufficient liquidity of commercial banks to supply farmers with credit sources. Also, collateral requirements and high interest rates restrict farmers access to finance. This is an example of what Andreoni and Chang (2019) described "one sector development is limited by another one". Therefore, Andreoni and Chang (2019) bring attention to the whole package of measures in industrial policy. Meanwhile, giving clusters subsidized credits is at least some sort of the manifestation of incentives to promote investments in non-traditional areas (the "carrots").

Regarding sticks, state agencies including the Ministry of Agriculture monitor cluster activity. If clusters fail to fulfill certain criteria, the government threatens to close them down. The RCM No 733 from 4 December 2021 refers to the agreement among the Ministry of Agriculture, provincial khokimiyats, clusters' association and cluster owners. The cluster activity is monitored by those actors at least once a year. According to the agreement, clusters take responsibilities for capital investment, job creation, exports and others.

Labour mobilisation

Shtaltovna and Hornridge (2014) and McGuire and Laaser (2018) provided evidence that people including teachers and students were obliged to participate in the cotton harvest (Table 7). Previously, the centralized cotton production system used child and forced labor. One of the anticipated results of clusters in Uzbekistan was a reduction of child and forced labor in cotton production (ILO 2019). The first author has not observed forced or child labor during field visits and interviews. This is consistent with Cotton Campaign (2021), which reported a massive decline of forced labor during 2020. After the launch of the cluster policy, farmers started either to attract local people or use cotton-harvesting combines. Also, farmers are willing to use harvesting combines if the cotton combines provide high quality service (I8). The clusters studied were eager to gradually shift to the practice of harvesting combines too.

Since the start of the cluster policy, cotton harvesting has been structered in the same fashion throughout Uzbekistan (ILO 2019 and Asfaw 2019). The Council of Farmers, which looks like a non-governmental organization, but de facto operates as a state agency (Shtaltovna and Hornridge 2014, hires so-called "cotton picker brigades". This is absolutely voluntary. Each district includes 80–120 such brigades, and 70–100 cotton pickers are hired per brigade. Brigade leaders are selected by the Council of Farmers. Indeed, the majority of the brigade leaders are from villages and familiar with the locals. The payment to the brigade leaders is organized by the Ministry of Employment and Labour Relations. The minimum payment under the first and the second picking has also increased over years (Table 8). There are several farmers which pay higher based on picking time and capacity. For example, in October 2022, one farmer paid US$0.21 per kilo during the second picking, which is higher than the minimum payment given below.

As we have presented, there is a tendency toward labor market liberalization in rural areas. The harvesting payment is increasing and the way of attracting people has been changed. Also, the willingness to use cotton combines has increased. This situation introduces new carrots and sticks to clusters, e.g. now it pays off to adopt mechanization that replaces labor most effectively.

Crop choice

For Uzbekistan, cotton remains a strategic crop (Asfaw 2019; Bae and Mah 2019; Djanibekov et al. 2012; Sadler 2006) and a centerpiece of agriculture (Rudenko et al. 2013) (Table 7). Farm activity depends on meeting the state plans (Djanibekov and Finger 2018; Djanibekov et al. 2015; Lombardozzi 2020; Shtaltovna and Hornridge 2014). A first, the establishment of cotton clusters eliminated neither the production quota nor the price setting (Petrick and Djanibekov 2019). In 2020, Presidential Decree No 4633 from 6 March 2020 abolished the production targets, however, crop allocation policy still remains.

ILO (2019) reports that due to factors such as unfavorable weather conditions and pests, the harvest was lower in some farms in 2018. As a result, up to 15% of farmers went into arrears concerning the repayment of their debts. During the interviews, the manager of Baht textile cluster (I4) highlighted that:

> In 2017, when the cluster started, there were 1600 farmers, nowadays the cluster has 585 farmers due to farm consolidation and farmers' performance. (August 12, 2019)

Moreover, clusters do not influence the crop choice directly, but their role in the process of decision making on crop choice is increasing. The area planted to cotton can be changed only with the agreement of state agencies under certain circumstances: weather conditions, water availability, or the implementation of a crop diversification program.

Our analysis shows that the insecurity of land tenure and lack of crop choice (i.e. property rights issues) are still the most important problems for farmers. The cluster reform does not affect the state crop-allocation-regime and there exists the risk and uncertainty of the future farm activity. Niyazmetov, Soliev and Theesfeld (2021) found that farmers are skeptical about the agricultural reforms in Uzbekistan. The cotton reform only encompasses the resolutions from central government and their local implementation, however, detailed and practical operationalization of the top-down measures have been lacking. The various resolutions express that there is lack of of the concrete development pathway for clusters. This requires institutional development and policy alignment (Andreoni and Chang 2019) procedures as an ongoing process.

Cotton price

The Uzbek government has maintained strict control over the price of raw cotton over years (Table 7). Farmers had to deliver the raw cotton at the procurement price, which was much less than market prices (Djanibekov and Finger 2018). In 2017, the farm gate price was an average US$200–250/ton (Figure 4), however, it increased to US$342 in 2018 (ILO 2019). In 2019, the farm gate price comprised an average

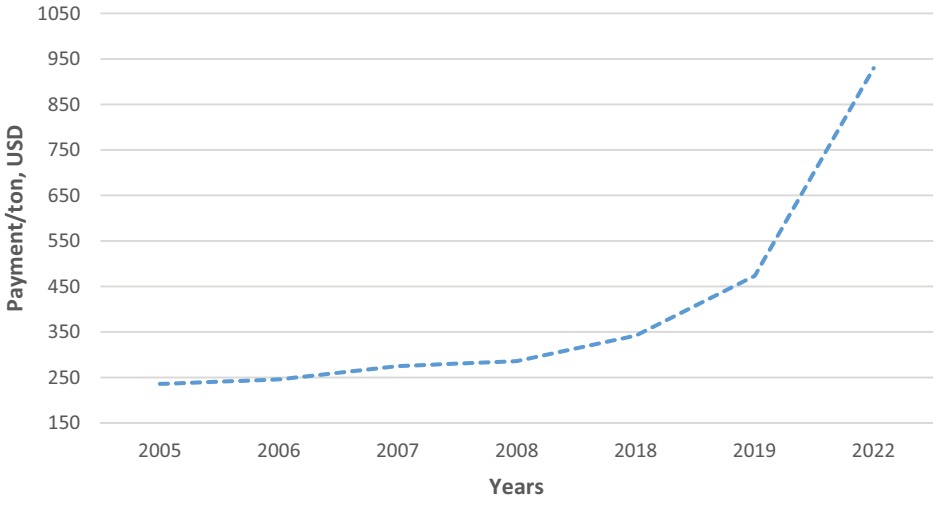

Figure 4. Farm gate price trend in Uzbekistan. Source: authors based on Rudenko et al. (2009), ILO (2019) and governmental resolutions.

UZS4,500,000 per ton which is about US$474 (Governmental resolutions and interviews).

To provide incentives to farmers and clusters, Presidential Decree No 4633 from 6 March 2020 announced the abolishment of the state price-setting practice. However, the decree refers to the minimum price that state agencies announce yearly. In this case, it really depends on clusters to pay more or just the minimum price to farmers. Nevertheless, increasing prices due to cotton sector liberalization also provide new "carrots" to farms, through additional production incentives. At the same time, following Andreoni and Chang (2019), an explicit inclusion of farmers in price setting diminishes the conflict of interests between farmers and clusters. This may lead to the increase in the role and bargaining power of farmers. Otherwise, most likely, clusters just provide the state announced price as we observed in the cases.

Marketing channels

In Australia and the U.S.A., farmers play a key role in the value chain (Sadler 2006). In Uzbekistan, gins controlled by SJSC Uzpahtasanoat are dominant. Consequently, the gins decide whether to sell fiber to domestic markets or export (Golub and Kastelmen 2015; Pomfret 2008). As displayed in Table 7, before 2018, farmers did not have alternatives to sell to different gins. The local authorities controlled the cotton delivery during the harvest. Farmers did not have bargaining power in the contractual relations with gins (Djanibekov et al. 2015; Rudenko et al. 2013; Rudenko, Lamers, and Grote 2009; Shtaltovna and Hornridge 2014).

Table 6. The different characteristics of clusters.

Elements of clusters	Conceptual literature	Uzbekistan
Cluster participants	Various stakeholders	Single textile firm
Cluster boundaries	No limit	Limited
Choice to join or not	Free choice	No choice
Policy design	Bottom up	Top down

Source: authors.

Our cases show that farmers under the cluster system are obliged to deliver the cotton to the "predefined" clusters without alternatives (Table 7). ILO (2019) emphasizes the risk that current clusters turn into private regional cotton monopsonies. According to the deputy manager of Bo'ston cluster (I1):

> The cluster is a single one in the district and there is no other cluster. Farms have only the option to conclude agreements with this cluster. Farms, which are located near to other districts, cannot make an agreement with clusters of other districts. (July 10, 2019)

As we learned during interviews, all cotton farmers in the districts have to make agreements with the "predetermined" clusters. Farmers have no rights to deliver to other clusters, at the same time other clusters do not accept cotton from other farmers if those farmers are from other clusters (I1, I4, I6, I17). Yusupov (2019) argues that cluster model does not necessarily mean

Table 7. Cotton value chains before and after implementation of cluster strategy.

Reform area	Prior to 2018	Post 2018
Agricultural inputs & services	Input supply by the state. Control and supervision of farms	Liberalized input market. Clusters control inputs/services
Credit access	State provides loans to farms and controls their use.	Clusters and farmers receive and allocate the loan to input providers.
Cotton picking	Mobilized labor to pick cotton through state organizations	Reduced forced labor of students or teachers
Crop choice and production	Procurement quota for cotton, no crop choice	Procurement for minimum volume, no crop choice
Cotton price	Procurement price set by state	Procurement minimum price set by state
Market power of cotton processors	A single state cotton company. Monopsony power	Predefined clusters. Monopsony power

Source: authors based on own fieldwork, Pomfret (2008), Rudenko et al. (2009, 2013). Djanibekov et al. (2010), Shtaltovna and Hornridge (2014), Djanibekov and Finger (2018), ILO (2019).

Table 8. Payment for manual harvest.

Indicator	2018	2019	2020	2021	2022
Payment for manual harvest per kilo under the first picking, USD	0.081	0.085	0.096	0.112	0.136
Relative change to previous year	-	+5%	+13%	+16%	+21%
Payment for manual harvest per kilo under the second picking, USD	0.123	0.127	0.135	0.141	0.164
Relative change to previous year	-	+3%	+6%	+4%	+16%

Source: authors based governmental resolutions.

Table 9. Uzbekistan's export of textile goods and countries with highest shares in export, in million USD.

Indicators	2018	2019	2020	2021	2022
Total export	14257.9	17458.7	15127.7	16610.6	19309.1
Textile goods	1300.3	1626.9	1922.2	2927.2	3178
Share %	9.1	9.3	12.7	17.6	16.5
Cotton fiber	222.1	281.6	78.8	-	-
Share %	1.5	1.6	0.5	-	-

Source: stat.uz.

Table 10. Major destination countries for Uzbekistan's export of textile goods, in million USD.

Countries	2018	2019	2020	2021	2022
Russia	542.8	592.3	655.5	910.7	1264.9
China	326.7	437.6	438.2	636.3	274
Kyrgyzstan	70.2	96.6	283.9	401.1	513.4
Turkey	119.8	196.7	206.1	461.1	519.1
Kazakhstan	39.2	39.7	42.3	48.6	61.1
Tajikistan	8.7	13.7	34.7	21.7	71.9

Source: stat.uz.

the emergence of cotton market, while it creates a new form of dependency of the farms on clusters.

Nevertheless, the area of marketing of processed cotton is where cluster effects should be most visible compared to other steps of the cotton value chain. As remarked above, while the field production and primary processing stages of cotton seems to be fairly standardized, more flexibility and potential competition may emerge in the processing and marketing stages, e.g. concerning innovative products, or products tailored to specific groups of customers, or specific export channels. That

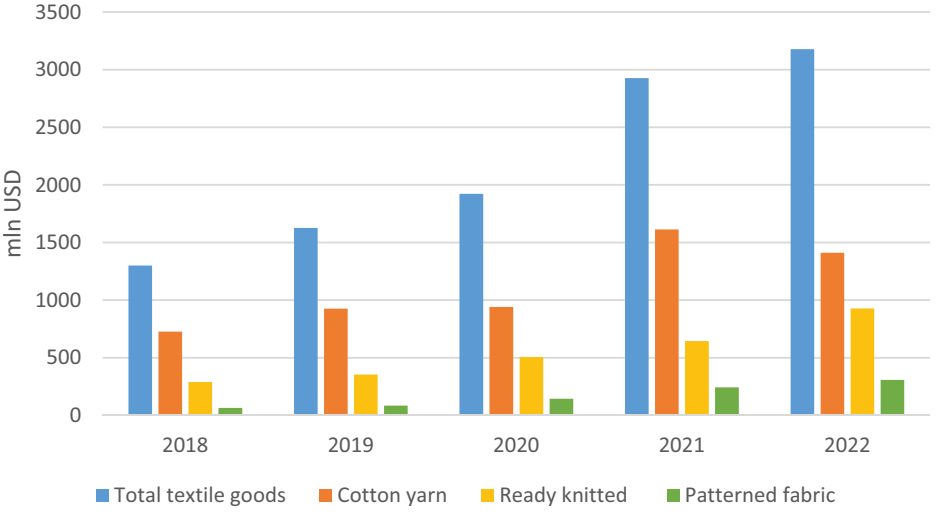

Figure 5. Dynamics of the textile goods export over years. Source: authors based on stat.uz

would be a "playground" of business activity that a cluster could promote. Following Rodrik (2009), the above-mentioned liberalized environment provides "carrots" to clusters to diversify processing and expand export geography. In terms of figures, the share of textile goods in Uzbekistan's total export has increased over recent years, from 9.1% to 16.5% (Table 9). Notably, raw cotton exports stopped in 2022 compared to 2018.

In 2022 compared to 2018, the export of processed textile goods to Kyrgyzstan, Turkey and Tajikistan had increased substantially (Table 10). However, full processing of cotton including all steps (namely fiber, yarn, fabric, and end product) is still lacking. According to the interviews and field visits, clusters primarily process the cotton fiber one step further as yarn and export it to Turkey or Russia directly, or they sell it in the domestic market. Figure 5 displays the export of total textile goods and the share of yarn, ready knitted and garments, and knitted fabric in the export of textile goods. Cotton yarn is the dominant textile product exported from Uzbekistan, with around 52% share on average. The ready knitted and patterned fabric make up approximately 24% and 7% of total textile goods on average respectively in the given period.

Recent policy developments

After we concluded the main part of our fieldwork, Presidential Resolution No. 4633 from March 2020 was adopted. It continued the reform of the cotton sector in the following areas: a) the government continues the system of crop-allocation regime, b) it abolishes the state production target for cotton, c) reform of the state financing of cotton production. The resolution mentions several reforms in financing cotton farmers and implements the inclusion of other commercial banks into the credit provision as alternative options, d) introduction of a minimum procurement price for raw cotton based on production costs and export parity prices, e) provincial governments are no longer responsible for labor mobilization. The resolution forbids provincial khokimats to intervene into the labor provision process during cotton harvesting, f) elimination of state cotton procurement and marketing. Until 2020, the government was responsible for buying all raw cotton produced. The government will now compensate a certain part of the interest rate of the credits attracted by the clusters to purchase the raw cotton from the farmers.

According to the Presidential Resolution No 5009 of 26 February 2021, up to three cluster companies can operate in one district and farmers can choose any of them. In addition, Presidential Decree No 14 from 16 November 2021 states that farmers can contract with other clusters in the corresponding province. If implemented, it will address our major concern about monopsony structures in cotton processing, but that remains to be seen.

Conclusion

Our empirical analysis shows striking differences between the definitions of clusters in the economic literature on the one hand and their implementation in Uzbekistan on the other. The main difference concerns the cluster participants. The cluster definition refers to a group of independent economic actors in a particular location, while for Uzbekistan, a cluster is a single vertically integrated company in the textile industry (Figure 3). Theoretically, the boundaries of clusters may cross administrative borders, but our case clusters are just based on territories of districts and sub districts. The clusters are the privatized successors of the former semi-state ginneries in their existing locations.

We analyzed how the Uzbek cluster policy adhered to the principles of industrial policy stressed by Rodrik (2009), and Andreoni and Chang (2019) (i.e. embeddedness and strategic coordination, carrot and sticks, accountability and inclusion of actors, structural interdependencies, and institutional development and policy alignments). Overall, the involvement of the private sector in cotton production has increased and our case studies show that the state has partially withdrawn from cotton production and processing, e.g. in input provision. However, recent reforms are far from eliminated state control over cotton production. Rather than providing farmers with a liberalized environment, the state passed on several responsibilities to the newly established "cluster" organizations. Clusters received control over the subsidized credit sources and input allocation in cotton production, which may entail some efficiency improvements compared to the state administration. The state continues its policy of crop-allocation regime, implying that farmers do not have a choice whether to grow cotton or not. Although the government has increased the farm-gate price recently, clusters do not pass on international market prices to farmers. The current design of cotton clusters exhibits a monopsony condition in which farmers have to sell their products to the single predefined cluster organization. Our cases confirm a tendency also observed in the gray literature that forced and child labor receded in the cotton sector. The government no longer obliges workers of state organizations to participate in the cotton harvest. In turn, clusters and farmers have become more likely to employ cotton harvesting combines and agronomic expertise more broadly. We conclude that from the farmers' perspective, recent reforms have led to moderate changes at best, while clusters have started to play a dominant role in the cotton sector.

The establishment of widely lacked transparency from the farmers' point of view. The government should support clusters that evolve naturally as a result of the initiatives and interactions of actors: farmers, processors, input suppliers and other actors. Based on the insights of the industrial policy literature, the Uzbek government should implement strategies that allow farmers' voices to be heard.

Rather than establishing clusters at large scales, an institutional environment that enables bottom-up initiatives should be promoted. As part of such an institutional environment, we suggest that the cluster reform should address accountability and considerations of various stakeholders in the cotton sector. These questions should be discussed more openly: are farmers as main cotton growers ready to work with clusters? Do legal frameworks to organize clusters exist? Which norms, rules and procedures function in practice? Who decides what?

Following Rodrik (2009) and FAO (2018), we provide further recommendations to develop the cotton sector. These include (i) improving farmers' technical and contractual capacity, (ii) economic diversification by incentivizing only "new" activities, (iii) promoting activities: trainings, feasibility studies, infrastructure investment, and adoption of new technologies rather than targeting the whole sector, and (iv) continuous monitoring of the agencies that implement reform measures. These should be taken seriously in future reforms of the cotton value chain.

Notes

1. Uzpahtasanoat was established in 2001. It involved 172 joint stock companies, seven limited liability companies and one joint venture (Rudenko, Lamers and Grote (2009).
2. Agrobank was established in 1995. The shareholders of the Bank are the Fund for Reconstruction and Development of Uzbekistan (66%), Ministry of Finance (24%), private entities (7%), and others (3%) (Agrobank.uz 2018).

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