

Republic of Moldova



TECHNOLOGY NEEDS ASSESSMENT FOR CLIMATE CHANGE ADAPTATION

REPORT II

ANALYSIS OF BARRIERS AND ENABLING FRAMEWORK

October, 2012

Supported by



PREFACE

The Republic of Moldova has signed the United Nations Framework Convention on Climate Change (UNFCCC) on June 12, 1992, ratified it on March 16, 1995 and for our country the Convention entered into force on September 7, 1995. On January 28, 2011 the Republic of Moldova has associated with the Copenhagen Agreement of the United Nations Framework on Climate Change. Under this Agreement, our country has set a new target aimed at Greenhouse Gas (GHG) emissions reduction, specifying "reduction of total national levels of GHG emissions by not less than 25% by 2020 compared to the reference year (1990). Hereby, it is determined that this target shall be achieved by implementing global economic mechanisms focused on mitigating climate change in accordance with UNFCCC principles and decisions."

The recent and underway policies of the Republic of Moldova on climate change mitigation are aimed at promoting energy efficiency and renewable energy sources in all sectors of the national economy, systematic afforestation activities and rational land management, promoting innovative approaches and environmentally friendly technologies and exploring carbon financing mechanisms.

In conformity with the general objective of the Convention, which sets as a target the maximum global average temperature growth until 2100 by no more than 2⁰C, the Republic of Moldova has decided to undertake a transition to a low GHG emissions development path. The first step in this direction was made in 2011 when development of the Low-Emission Development Strategy and Climate Change Adaptation Strategy started. Approval of these strategies is planned for 2013, which will allow access to the long-term financing mechanisms under the Convention to implement the so-called Nationally Appropriate Mitigation Actions (NAMA) and adaptation measures. Technology needs assessment in the context of climate change mitigation and adaptation is a crucial first step in achieving the objectives of these strategies. Methodological aspects of evaluation and identification of appropriate technologies in climate change mitigation and adaptation revealed during the TNA will serve as a starting point in promoting them nationwide. In the future the Republic of Moldova will address climate change issues so, that they can be included in all national and sector development policies and strategies of the country. This status will allow our country to get integrated in the global process of climate change mitigation and adaptation to this phenomenon at the national level.

ACKNOWLEDGMENTS

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Abbreviations

ACSA	Agency for Consultancy and Training in Agriculture
ASM	Academy of Sciences of Moldova
CISRA	Centralized Irrigation System Rehabilitation Activity
LEDS	Low Emission Development Strategy
MAFI	Ministry of Agriculture and Food Industry
MCC	Project funded by the Millennium Challenge Corporation
MCDA	Multi Criteria Decision Analysis
MFNC	Moldova's First National Communication under the UNFCCC
MoEN	Ministry of Environment
MSNC	Moldova's Second National Communication under the UNFCCC
NCCAS	National Climate Change Adaptation Strategy
NDS	National Development Strategy
NHDR	National Human Development Report
NSNHM	National Strategy of Natural Hazards Mitigation
TAP	Technology Action Plan
TFS	Technology Fact Sheet
THVA	Transition to High Value Agriculture
UASM	State Agricultural University of Moldova
UNFCCC	United Nations Framework Convention on Climate Change
GEF	Global Environment Facility

LIST OF FIGURES

Fig. 1. Logical Problem Analysis of technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology. Problem tree.....	88
Fig. 2. Logical Problem Analysis of technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology. Objective tree.....	89
Fig.3. Market Map of Conservation system of soil tillage without herbicide for winter wheat technology.	90
Fig.4. Logical Problem Analysis of technology transfer for Vetch field as green fertilizer into 5 year crop rotation technology. Problem tree.....	91
Fig.5. Logical Problem Analysis of technology transfer for Vetch field as green fertilizer into 5 year crop rotation technology. Objective tree.	93
Fig.6. Market mapping of Vetch field as green fertilizer into 5 year crop rotation technology.	94
Fig.7. Logical Problem Analysis of technology transfer for Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology. Problem Tree.	95
Fig.8. Logical Problem Analysis (LPA) of technology transfer for Applying 50t/ha manure with bedding to agricultural soils once per five years. Objective Tree.	97
Fig.9. Market mapping of Applying of 50 t/ha of manure with bedding to agricultural soils once per five years technology.	98
Fig.10. Logical Problem Analysis of technology transfer of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves health care measure. Problem Tree.	100
Fig.11. Logical Problem Analysis of technology transfer of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves health care measure. Objective tree.	101
Fig.12. Market mapping of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat wave health care measure.	102
Fig.13 Logical Problem Analysis (LPA) of technology transfer for Rural population supply with drinking water of guaranteed quality. Building of local water supply systems. Problem Tree.....	103
Fig.14. Logical Problem Analysis (LPA) of technology transfer for Rural population supply with drinking water of guaranteed quality. Building of local water supply systems. Objective tree.....	105
Fig.15. Market mapping of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology.....	106

LIST OF TABLES

Table 1. Identified barriers to technology transfer in the Agriculture Sector	15
Table2. Proposed measures to overcome barriers to technology transfer in the Agriculture Sector.....	16
Table3. Identified barriers to technology transfer in the Human Health Sector	18
Table 4. Proposed measures to overcome barriers to technology transfer in the Human Health Sector	19
Table 1.2.2.1. Long List of Barriers to technology transfer for <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.....	23
Table 1.2.2.2. List of barriers and hierarchy classification.....	31
Table 1.2.2.3. The List of Key Barriers to technology transfer for <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.	31

Table 1.2.3.1. The List of barriers and measures to technology transfer of <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.	33
Table 1.2.3.2. The list of measures, their economic profile, incentives used and their effects.....	34
Table 1.2.3.3. Categories of measures and incentives	34
Table 1.2.3.4. The Final List of measures to overcome barriers to technology transfer of <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.....	35
Table 1.3.2.1. The Long List of Barriers to technology transfer of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.	37
Table 1.3.2.2. List of barriers and hierarchy classification.....	40
Table 1.3.2.3. The List of Key Barrier to technology transfer for <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.	41
Table 1.3.3.1. The List of barriers and measures to overcome barriers to technology transfer of <i>Vetch field as green fertilizer into 5 year crop rotation technology</i>	42
Table 1.3.3.2. Categories of measures and incentives.	43
Table 1.3.3.3. The Final List of measures to overcome technology barriers for <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.	44
Table 1.4.2.1. The Long List of Barriers to technology transfer of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	46
Table 1.4.2.2. List of barriers and hierarchy classification.....	48
Table 1.4.2.3. List of Key Barriers to technology transfer for <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	49
Table 1.4.3.1. The List of barriers and measures to overcome barriers to technology transfer of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	51
Table 1.4.3.2. Categories of measures and incentives	52
Table 1.4.3.3. The Final List of measures proposed to overcome technology transfer for <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i>	53
Table 1.6.1. Enabling business environment of <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.	55
Table 1.6.2. Service providers and service provision for <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.	56
Table 1.6.3. Enabling business environment of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.	56
Table 1.6.4. Service providers and service provision of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.	57
Table 1.6.5. Enabling business environment of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	58
Table 1.6.6. Service providers and service provision of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	58
Table 2.2.2.1. Long List of Barriers to transfer and diffusion of <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves</i> health care measure.....	62
Table 2.2.2.2. List of barriers and hierarchy classification.....	64
Table 2.2.2.3. List of key barriers to transfer and diffusion of <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves</i> health care measure.....	65

Table 2.2.3.1. List of barriers and measures for <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat</i> health care measure.	66
Table 2.2.3.2 Categories of measures and incentives for <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat</i> health care measure.	67
Table 2.2.3.3. The list of measures, economic profile, incentives used and their effects for <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat</i>	68
Table 2.2.3.4. The Final List of measures for <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat</i>	69
Table 2.3.2.1. Long List of Barriers to transfer of <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i> health care measure.	70
Table 2.3.2.2. List of barriers and hierarchy classification.....	73
Table 2.3.2.3. List of Key Barriers to technology transfer <i>Rural population supply with potable water of guaranteed quality. Building of local water supply system</i> health care measure.	74
Table 2.3.3.1. The List of barriers and measures for <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i> health care measure/technology.....	75
Table 2.3.3.2. Categories of measures and incentives for <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i> technology diffusion.	76
Table 2.3.3.3. List of measures, their economic profile, incentives and the effect of proposed measures for <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i> technology.....	77
Table 2.3.3.4. The Final List of measures for <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i> technology.	79
Table 2.5.1. Enabling Environment of <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves</i> health care measure/technology.....	80
Table 2.5.2. The operational measures undertaken by public service providers: <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat</i>	81
Table 2.5.3. Enabling environment of <i>Rural population supply with potable water of guaranteed quality water</i> health care measure.	82
Table 2.5.4. The operational measures undertaken by public service providers for <i>Rural population supply with potable water of guaranteed quality. Building of local water supply systems</i>	83
Table 1.1. Initial data for cost-benefit analysis.....	110
Table 1.2. Needed investments.....	110
Table 1.3. Operational costs.....	110
Table 1.4. Cost Effectiveness Analysis of <i>Conservation system of soil tillage without herbicides for winter wheat</i> technology.	111
Table 2.1. Initial data to determine the needed investments.....	113
Table 2.2. General analysis of costs for an area of 40 thousand ha.....	114
Table 2.3. Investments needed to purchase equipment.....	114
Table 2.4. Operational costs.....	114
Table 2.5. Global yield of grain harvested as a result of using vetch in crop rotation.....	115
Table 2.6. Calculation of marginal contribution.....	115
Tabel 2.7. Cost Cost Effectiveness Analysis of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology.....	115
Table 3.1. Initial data to determine the investments needed for a communal platform.....	117

Table 3.2. Investments needs and current expenditures for the first five years of a communal platform work	118
Table 3.3. Purchasing the equipment needed to ensure operation of the communal platform	118
Table 3.4. Calculations for the operation of the communal platform for 5 years	118
Table 3.5. Analysis of economic efficiency and profitability.....	118
Table 3. 6. Cost Benefits Analysis for non-profit activity	120
Tabel3 .7. Cost Benefits Analysis for commercial activity	120
Table 4. 1. Initial data for cost benefit analysis	122
Table4.2. Necessary investments	123
Table4.3. Operational costs	123
Table4. 4. Financial means needed to set up mobile health stations during the heat.....	123
Table 5.1. Initial data for cost-benefit analysis.....	126
Table 5.2. Capital investments needed to build a water pipeline	127
Table5. 3. Operational costs	127
Table 5.4. Projection of Income earned as a result of selling drinking water supply services	127
Table5. 5. Cost-benefit analysis	127
Table 6. Cost Effectiveness Analysis of of <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems.</i>	128

TABLE OF CONTENTS

ACKNOWLEDGMENTS	3
Abbreviations	4
LIST OF FIGURES	5
LIST OF TABLES	5
Executive Summary	13
Chapter 1. Agriculture Sector	20
1.1. Preliminary targets for technology transfer and diffusion.....	20
1.2. Barrier analysis and possible enabling measures for <i>Conservation system of soil tillage without herbicides for winter wheat.</i>	22
1.3. Barrier analysis and possible enabling measures for <i>Vetch field as green fertilizer into 5 year crop rotation technology.</i>	35
1.4. Barrier analysis and possible enabling measures for <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.</i>	45
1.5. The linkages of the barriers identified	53
1.6. Enabling framework for overcoming the barriers in Agriculture sector	54
Chapter 2. Human Health Sector.....	59
2.1 Preliminary targets for technology transfer and diffusion.....	59
2.2. Barrier analysis and possible enabling measures for <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves.</i>	61
2.3. Barrier analysis and possible enabling measures of <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology.</i>	69
2. 4. The linkages of the barriers identified	79
2.5. Enabling framework for overcoming the barriers.....	80
REFERENCES.....	85
ANNEXES 1-4.....	87
Annex I. Problem trees, Objective trees and Market Mapping.....	88
Annex II. List of stakeholders involved and their contacts.....	107
Annex III. Policy Factsheets and Cost-benefit Analysis.....	108
AIII.1. <i>Conservation system of soil tillage without herbicides for winter wheat technology.</i>	108
AIII.1.1 POLICY FACT SHEET for <i>Conservation system of soil tillage without herbicides for winter wheat technology.</i>	108
AIII.1.2. Economic-financial analysis of <i>Conservation system of soil tillage without herbicides for winter wheat technology supported by policy and regulatory path mentioned in the Report.</i>	110
AIII.1.3 Cost Effectiveness Analysis of <i>Conservation system of soil tillage without herbicides for winter wheat technology.</i>	111
AIII.2. <i>Vetch field as green fertilizer into 5 year crop rotation technology.</i>	112
AIII.2.1 POLICY FACT SHEET for <i>Vetch field as green fertilizer into 5 year crop rotation technology.</i>	112

AIII.2.2. Economic- financial analysis of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology supported by policy and regulatory path mentioned in the Report.	113
AIII.2.3. Cost Effectiveness Analysis of <i>Vetch field as green fertilizer into 5 year crop rotation</i> technology	115
AIII.3. <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.....	116
AIII.3.1 POLICY FACT SHEET for <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology.	116
AIII.3.2 Economic- financial analysis of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology supported by policy and regulatory path mentioned in the Report.	117
AIII.3.3 Cost Effectiveness Analysis of <i>Applying 50 t/ha of manure with bedding to agricultural soils once per five years</i> technology	120
AIII.4. <i>Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves</i> health care measure.....	121
AIII.4.1 Policy Fact Sheet of <i>Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves</i> health care measure.	121
AIII.4.2 Economic- financial analysis of <i>Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves</i> measure supported by policy and regulatory path mentioned in the Report.	122
AIII.4.3 Cost effectiveness analysis of <i>Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves</i>	123
AIII.5. <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems</i> technology.....	125
AIII.5.1 Policy Fact Sheet for <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems</i> technology.	125
AIII.5.2 Economic- financial analysis of <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems</i> technology supported by policy and regulatory path mentioned in the Report.	126
AIII.5.3 Cost Effectiveness Analysis for of <i>Rural population supply with drinking water of guaranteed quality. Building of local water supply systems</i> technology	128

FOREWORD

I am proud to provide a foreword to this report, which is one of the outputs of the 'Technology Needs Assessment' (TNA) conducted in the Republic of Moldova. The TNA process was coordinated by the Ministry of Environment through Climate Change Office (CCO), who, with the help of local experts, conducted a thorough stakeholder consultation and analysis of the technical and policy options for increasing the use of low-carbon and climate-resilient technologies in the Republic of Moldova.

Following methodological and technical assistance provided by the UNEP Risø Centre, the CCO facilitated a stakeholder-led Multi Criteria Analysis for the prioritisation of both mitigation and adaptation-side technologies. This was followed by stakeholder consultations regarding the most important barriers to the uptake of these technologies, and what can be done to overcome them.

The TNA process has finalised with Technology Action Plans (TAPs) that provide a clear and realistic road map to reforming market incentives and attracting investment in specific technologies. As such, these documents allow us to facilitate the transfer of key climate technologies that also serve to drive economic growth and development. Above all, the TAPs offer practical solutions for the sustainable development of the country's agricultural sector, upon which we depend heavily for our income and livelihoods.

Gheorghe Şalaru

Minister of Environment of the Republic of Moldova

March 2013



Report II

Barrier Analysis and Enabling Framework

Executive Summary

Based on identified, assessed and selected adaptation technologies for climate change of the Republic of Moldova, the working groups of Adaptation component of TNA Project have performed a barrier analysis and provided solutions to overcome barriers to technology transfer and diffusion.

Three identified and top rated technologies during the technology needs assessment phase of Agriculture sector ((i) **Conservation system of soil tillage without herbicides for winter wheat**; (ii) **Applying 50 t/ha of manure with bedding to agricultural soils once per five years**; (iii) **Vetch field as green fertilizer into 5 year crop rotation** and two of Human Health sector (i) **Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves**; (ii) **Rural population supply with potable water of guaranteed quality. Building of local water supply systems** were analyzed and assessed during the second phase of TNA Project. The Report consists of two chapters dedicated to Agriculture and Human Health sectors.

Project activities were implemented in consultation with stakeholders, representatives from the Ministry of Environment, Ministry of Agriculture and Food Industry, Ministry of Human Health, research institutions, business, academia, NGOs. The stakeholders were part of national teams divided into two working groups assigned to Agriculture and Human Health sectors.

During the implementation of this phase, the groups have received guidance from UNEP Riso Center Country Coordinator, Asian Institute of Technology (AIT). The workgroups have applied methodological guidance provided during the TNA workshop in Bangkok (21-24 February, 2012) and following the methodological sources: *Overcoming barriers to the transfer and diffusion of Climate Technologies (Boldt, J., I. Nygaard, U.E. Hansen, S. Traep. UNEP Riso Centre)*¹, *UNDP Handbook Technology Needs Assessment for Climate Change*², *Climate TechWiki website*,³ *Supplemental Cost-Benefit Economic Analysis Guide (T.J. Conway)*⁴, *TNA guide Technologies for Climate Change Adaptation, Agriculture sector*⁵.

After consideration of technology characteristics, the workgroups have classified them as consumer goods with an intention to mass market it, having as potential consumers private enterprises, State agencies, research institutions, farmers associations, others.

The **barrier analysis** was performed stepwise, starting with setting of preliminary targets. Sectoral development policies, development plans and programs, each technology characteristics have been considered in setting targets to transfer of technologies in soil conservation and soil improvement field, provisional of posts for emergency care during heat waves and the provision of quality water in rural area.

During the analysis of barriers the experts have performed a desk study of policy documents, regulatory acts, scientific articles, other relevant information, also based on previous results of the technology selection process, and commonly with stakeholders have identified the primary reasons why the technology is not currently implemented or has a small area of implementation. The barriers listed in the Long List of Barriers have been screened according to their significance to technology transfer and ranked based on a 1 - 5 scale. A close work with stakeholders' representatives was done in order to reach common agreement on the significance of a particular barrier. After the comprehensive understanding achieved, the experts came up with the list of key barriers after non-essential being removed from the list.

In order to understand the core problems in technology transfer, the working group of each sector has applied **Logical Problem Analysis (LPA)**. The cause/effect relations were organized in **Problem tree**, having the main problem put as starter problem, causes at the bottom of the tree and their effects in the upper part of the

¹ Overcoming barriers to the transfer and diffusion of Climate Technologies (Bodt, J., I. Nygaard, U.E. Hansen, S. Traep. UNEP Riso Center), (2012)

² UNFCCC/UNDP. Technology Needs Assessment for Climate Change. Handbook, 2010

³ <http://tech-action.org/guidebooks.htm>

⁴ Supplemental Cost-Benefit Economic Analysis Guide (T.J. Conway) (2009)

⁵ UNEP/GEF Technologies for Climate Change Adaptation , Agriculture sector .TNA Guide, 2011

Republic of Moldova

diagram. Using LPA the working groups were able to bring together the key elements of problems, apply logical analysis of interrelated elements, and identify linkages between problem elements and external factors. Thus, the Problem trees were used for understanding the causal relations of barriers, their linkages.

The next step of the Project was **the identification of measures** supporting technology transfer as actions that could be taken to enhance technology transfer. The experts have prepared national and sector specific information, scientific literature, other relevant information. The process of identification and description of measures to overcome barriers was done by working groups of both Agriculture and Human Health sectors in a same context as barrier analysis, applying the Logical Problem Analysis. The causal relations of barriers to technology transfer were seen also as opportunities for intervention by stakeholders to fully realize economic-social potential of technology. Applying LPA, the working groups have considered the circumstances these opportunities could be reached and set objectives for each technology, organizing them into the **Objective Tree**. This tool helped to visualize logically organized presentation of objectives for the improvement of technology transfer. Proposed measures were discussed according to their economic profile, incentives used and effects achieved.

The implementation of each analysed technology falls under jurisdiction of several regulations of the Republic of Moldova and the working groups have discussed the political environment and functioning regulations influencing technology transfer. Among listed policies and regulations the groups have identified the policy directly impacting technology implementation. The compressed information about it is presented in the **Policy Fact Sheets** of each technology.

The political path impacting technology implementation under a specified policy and regulatory acts is influenced by economic-financial conditions. These conditions have been analyzed applying **economic-financial analysis**. It is additional information for stakeholders and decision makers about the technology to be transferred. For profit versions of implementing technologies of both analyzed sectors prove that identified policy path under specific laws could be considered cost-effective. The non-profit version of some technologies was also considered.

Market analysis was performed by Adaptation national teams using **market mapping** approach. This approach helped to visualize commercial and institutional environment for each technology market. The whole system was considered in the context of its three main components:

- **Enable business environment.** The enabling environment of technology transfer was discussed from many viewpoints: institutional, administrative, legislative and policy frameworks, level of existing R&D, thus, contributing to an understanding of the trends that are affecting the market chain of each technology. Both for Agriculture and Human Health sectors the enabling environment consists not only of domestic, but also international factors. During the analysis of existing environment to enable the diffusion of each technology, the participants have indicated the gaps and improvements needed.
- **Market chain actors and linkages.** Market chain actors have been identified from the first steps in barrier analysis in the context of their contribution to technology product. They are State organizations and agencies, private business, NGOs other type of entities. Potential for the establishment of a collaborative partnership between them to ensure a more lucrative process was analyzed by groups.
- **Service providers.** Support services have been considered as input services from outside organizations and enterprises that could support the market chain's overall functioning for each technology. The particular services need for each technology have been identified. Most commonly specified services were market information, financial services, transport services, technical expertise and business advice, support for product development and diversification.

The output of this exercise is the **Market Map** of each technology provided in the Annex I.

Table 1. Identified barriers to technology transfer in the Agriculture Sector

Category	Conservation system of soil tillage without herbicides for winter wheat	Applying 50 t/ha of manure with bedding to agricultural soils once per five years	Vetch field as green fertilizer into 5 year crop rotation
Economic and Financial	High Up-front investment. Lack of inadequate access to financial resources. Inappropriate financial incentives and disincentives. High interest rates. Small farm size.	High Up-front investment. Lack of finance at low interest rates. Inadequate rural infrastructure and tenurial arrangements.	Scarcity of investment capital Excessive fragmentation of land. /Small farm size. Lack of finance at low interest rates. Inadequate rural infrastructure and tenurial arrangements.
Institutional capacity	Limited institutional capacity.	Organizational problems in collection and transport of waste from dispersed sources for centralized processing and value addition.	Lack of economic incentives for addressing environmental problems. Lack of standards and indicators to assess the quality of soils.
Network failures	Main stakeholders show lack of willingness to cooperate. Weak connectivity between actors favoring the new technology.	Lack of co-ordination among different interest groups.	Lack of co-ordination among different interest groups.
Market failures	Poor market infrastructure. Inadequate sources of increasing returns.	Undeveloped market with poor infrastructure. The absence of market prices for the environmental benefits from soil improvement works.	The absence of market prices for the environmental benefits of soil improvement works.
Policy, legal and regulatory	Insufficient legal and regulatory enforcement. Policy intermittency and uncertainty.	Lack of Law and Regulation of using organic waste. Insufficient and ineffective law enforcement.	Insufficient legal and regulatory framework. Lack of involvement of stakeholders in decision making.
Social, cultural and behavioral barriers	Lack of confidence in new climate technologies among farmers.		Lack of confidence in sustainable technologies among farmers.
Inadequate Information	Inadequate information.	Poor knowledge of rural population about the role of soil in sustainable agriculture.	Insufficient knowledge among agricultural businesses about soil improvement technologies.

Table2. Proposed measures to overcome barriers to technology transfer in the Agriculture Sector

Category	Conservation system of soil tillage without herbicides for winter wheat	Applying 50 t/ha of manure with bedding to agricultural soils once per five years	Vetch field as green fertilizer into 5 year crop rotation
Economic and Financial	<p>Creation of agricultural banks with low rate of interest.</p> <p>Reduce/avoid for profit taxes for farmers investing in sustainable agricultural practices, including procurement of equipment.</p> <p>Reduce taxes for the import of climate technologies.</p> <p>Consider incentives to attract investments in climate change technologies of Agriculture sector.</p> <p>Enforce promotion of climate technologies through subsidies for respecting good farming systems.</p>	<p>Promote tax incentives of farmers practicing sustainable production.</p> <p>Developing a system of economic incentives for agricultural enterprises that use manure and green fertilizers.</p> <p>Promote financing of soil improvement projects in rural areas.</p>	<p>Creation of agricultural banks with low rate of interest.</p> <p>Reduce/avoid for profit taxes for farmers investing in sustainable agricultural practices, including procurement of equipment.</p> <p>Release subsidies for farmers implementing climate technologies.</p>
Institutional capacity	<p>Improve R&D system in soil science.</p>	<p>Cadastre Agency intensifies of land consolidation process.</p>	<p>Cadastre Agency intensifies of land consolidation process.</p> <p>Improve R&D system in soil science.</p>
Network working	<p>Organize national and regional networking groups for farmers interested in promoting climate technologies.</p> <p>Organize Foundation of a consumer association in order to make a connection between agricultural producers and policy makers, to do lobby for a sustainable system of food production.</p>	<p>Assure an efficient coordination between the main actors of organic and green fertilizers chain.</p>	<p>Assure an efficient coordination between the main actors of organic and green fertilizers chain.</p> <p>Organize national and regional networking groups for farmers interested in promoting climate technologies.</p>
Market imperfection	<p>Develop the logistic for procurement by agricultural producers of equipment for climate technologies.</p> <p>Reduce restrictive policies for importing technology and equipment, to reduce import taxes.</p>	<p>Making it binding under the law or regulations on the use of manure in rural areas for municipalities to organize and control the construction of communal platforms, to build up the staff servicing the platforms and to organize the contractual relations between manure producers and agricultural businesses.</p>	

Republic of Moldova

<p>Policy, legal and regulatory</p>	<p>Enforcement of relevant legislation regarding soil conservation and soil management.</p> <p>To reduce restrictive policies for importing technology and equipment, to reduce import taxes.</p>	<p>Introduce fiscal and regulatory measures for reduction of manure wastes and promotion of manure utilization.</p> <p>Accountability assessment by introducing some specific points in the Land Code Act and the Moldovan Law on Environmental Protection.</p> <p>Introduce fiscal and regulatory measures for reduction of wastes/manure and promotion of manure utilization.</p>	<p>Increase accountability of farmers for long-term maintenance of soil quality.</p> <p>Provisions of soil management responsibilities in the Law on the Land Code and in the Law of the Republic of Moldova on Environmental Protection.</p> <p>Accountability assessment by introducing some specific points in the Land Code Act and the Moldovan Law on Environmental Protection.</p>
<p>Information and awareness</p>	<p>Increasing media interest in promoting climate technologies with larger participation of researcher, consultants and producers; more information about the positive influence of climate technologies.</p>	<p>Increased awareness of environmental issues in Agriculture sector.</p> <p>Raising the awareness of the local public administration and population about the problem of manure from an environmental, economic, social and sanitary perspective by creating consultancy centers.</p>	<p>Make the agricultural businesses aware about the environmentally friendly practices.</p>
<p>Human skills</p>	<p>Strengthen human capital base in the Agriculture sector.</p>	<p>Promote Programmes for providing training and education on soil management.</p>	<p>Promote Programmes for providing training and education on soil management.</p>

Table3. Identified barriers to technology transfer in the Human Health Sector

Category	Provisional posts of medical emergency care during heat waves	Rural population supply with drinking water of guaranteed quality
Economic and Financial	Lack of financial resources. Red tape (bureaucracy)	High cost of capital investments. Inadequate access to financial resources. Inappropriate financial incentives.
Institutional capacity	Limited institutional capacity.	Limited institutional capacity
Network failures		Lack of involvement of stakeholders in decision making.
Market failures	Weak connectivity between actors favoring the new technology.	Weak connectivity between actors favoring the new technology. Rising water demand from rural population.
Policy, Legal and regulatory	Insufficient legal and regulatory framework Inefficient enforcement. Policy intermittency uncertainty.	Lack of decision concerning designing of the centralized water supply system. Insufficient legal and regulatory framework in estimation of drinking water scarcity impact on population health.
Inadequate medical emergency	Lack of accommodation of provisional posts of medical emergency care and their supply.	
Social, cultural behavioral	Lack of confidence in new climate technologies.	Lack of confidence in new climate technologies.
Inadequate information	Lack of information about the number of the population suffering from extreme phenomena of climate change and places the events are happening.	Inadequate information.
Human skills	Lack of human capital. Lack of health service maintenance specialists.	Lack of skilled personnel in estimation of drinking water scarcity impact on population health.

Table 4. Proposed measures to overcome barriers to technology transfer in the Human Health Sector

Category	Provisional posts of medical emergency care during heat waves	Rural population supply with drinking water of guaranteed quality
Economic and Financial	<p>Ensure the assistance of private business, domestic and international donor support.</p> <p>Improve access to finance for climate change related health care measures.</p>	<p>Promote financing of water supply projects in rural areas.</p> <p>Consider incentives to attract investments in climate change technologies of the Human Health sector.</p>
Institutional capacity	Facilitate emergency care and prompt rehabilitation services in agglomerate public places during critical periods of heat.	Development of institutional framework for provision of centralized distribution of rural population with guaranteed quality of drinking water sources.
Network development	Assure an efficient coordination between urban authorities, services and relevant medical institutions.	Implement measures for increasing of decision-making participation at the ground level.
Policy, Legal and regulatory	Enforce the legal and regulatory framework support in order to assure proper functioning of the posts of temporary emergency care and rehabilitation.	Undertake a national investigation of underground water sources as base for policy enforcement in the area.
Information and awareness	Building up of database on diseases caused by climate change.	Better informing of rural population about health problems related to water quality.
Human skills	Strengthen human capital base in the Human Health sector.	Strengthen human capital base in the Human Health sector.

Chapter 1. Agriculture Sector

During the prioritization phase of Technology Needs Assessment Project the working group of Adaptation component has prioritized 3 top technologies of Agriculture sector with highest impact on country's adaptation potential and capability for technology transfer and diffusion:

- Conservation system of soil tillage without herbicides for winter wheat;
- Applying 50 t/ha of manure with bedding to agricultural soils once per five years;
- Vetch field as green fertilizer into 5 year crop rotation.

These technologies were subject to barrier analysis and enabling framework during the second phase of TNA Project.

Barrier analysis and their screening along with an elaboration of measures and market mapping require specific knowledge and application of tools.⁶ The Adaptation work group has met in several working meetings has an intensive electronic correspondence, many individual meetings between experts and team leader.

After discussing technology characteristics, the working group has categorized them as *consumer good* despite the circumstances that the Government can influence the adoption of these practices through various ways, which classifies it as one of the main actors of the market chain of these technologies, as in case of public goods. It was considered, that the development of "green market" and access to sustainable practices in Moldova have to be largely diffused and available for a large number of market players, including private business from private market actors, NGOs, research institutions, etc. This approach will promote rural entrepreneurship and economic diversification.

1.1. Preliminary targets for technology transfer and diffusion

The quality of soils has an important impact on crop productivity, livestock sector development, export of food products, welfare and ecological situation in the Republic of Moldova. The overall targets for improvement of soil conditions derive from a number of national and sectoral policies, strategies and development plans.

According to Moldova 2020: National Development Strategy⁷ medium- and long-term the main concern of authorities is to promote the people's welfare based on a clean environment. In this context, the Government's strategic vision over medium and long term is the reconciliation between the need for accelerated economic development and environmental protection in conformity with European standards.

The *Strategic priorities for the activities of the Ministry of Agriculture and Food Industry of the Republic of Moldova in the years 2011 – 2015*⁸ consist of 10 medium term priorities. One of the main objectives of the MAFI is to promote and implement conservation agriculture that would lead to increase of the soil fertility and preserve long-term quality and productive capacity of soils. The Programme measures linked to preservation of soil fertility includes stopping the active forms of soil degradation, application of soil fertility conservation and enhancement measures on an area of 1.7 million ha until 2020, creating conditions for implementation of modern growing technologies and know how in agriculture.

In the *National Strategy for Republic of Moldova Agroindustrial complex sustainable development (2008-2015)*⁹ one of the measures contributing to diminishing agriculture's vulnerability related to risk factors and environmental protection, erosion combating was specified as one of the main measures.

An important document-recommendation that establishes targets and practices is the *Moldovan Code of Good Agricultural Practice*¹⁰, which represents a series of generalizations taking into account the achievements of good practices allowing the prevention and diminishing of the negative impact of agriculture on the environment.

⁶ Implication in this exercise of a large number of people, during a workshop requires preliminary knowledge delivery and training of participants, which is costly, time requiring activity and not efficient at this stage of TNA Project. Due to the reason that barrier analysis of a particular technology is an investigation work performed mainly by experts in consultancy with stakeholders' representatives monitored by the team leader, the TNA Committee has decided to organise this process within working group.

⁷ *Moldova2020: National Development Strategy: 7 solutions for Republic of Moldova.*(2012)

⁸ *Strategic priorities for the activities of the Ministry of Agriculture and Food Industry of the Republic of Moldova in the years 2011 – 2015*

⁹ *National Strategy for Republic of Moldova Agroindustrial complex sustainable development (2008-2015)*

¹⁰ *Moldovan Code of Good Agricultural Practice* . <http://www.bsnn.org/pdf/GoodAgriculturalPractice-DRPII-21728.pdf>

Republic of Moldova

The *Governmental Programme for land revaluation and increase soil fertility for 2003-2010*¹¹ was the basic document for planning and implementation of central and local public administration bodies' state policy to protect land resources.

Along with the provisions of the Land Code, the Law on State Regulation of the land ownership regime, the state land cadastre and land monitoring and other laws, there is a stringent need to adopt measures for the protection and improvement of degraded soils and development of special projects and programs.

Despite the above mentioned efforts and great promise of sustainable agriculture in helping to alleviate the problems originated from the past intensive system of agriculture, adoption of sustainable practices for soil conservation and quality improvement remains low in Moldova. Therefore the TNA Project provides a great opportunity for Republic of Moldova to perform country-driven barriers analysis of transfer and diffusion of environmentally sound technologies and combine sustainable practices with adaptation measures to climate change.

Preliminary targets for *Conservation system of soil tillage without herbicides for winter wheat technology.*

- Stimulate using of resource conserving agriculture at least by 50% of agricultural producers in 2020.
- Adopt conservation tillage on three agro-ecological zones of the Republic of Moldova.
- Increase environmental beneficial influence via lowering the intensity of soil erosion and higher compensation of mineralisation losses of soil organic matter, reducing the consequences of global warming by higher carbon sequestration, efficient adaptation to climate change.
- Adopting conservation tillage technology to reduce labour, time and fuel costs by 50% or more compared to conventional agriculture.
- Promote wildlife (crop residues provide shelter and food for wildlife, such as game birds and small animals, which can result in additional farm revenue), improve air quality (reduced wind erosion, reduced fossil fuel emissions from tractors, reduced release of carbon dioxide into the atmosphere).

Preliminary targets for *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology*

- Implementing sustainable agriculture on the area of 200,000 ha, based on households' own resources, by applying to agricultural soils of 50 t / ha manure with bedding once in five years on one field in a 5 fields crop rotation scheme (an area of 40,000 ha annually).
- Restoring the soil quality over an area of 200, 000 ha in 3 parts of Moldova: North, Central, South over 20 years by creating a balance of organic matter, carbon and nitrogen in the soil as a result of systemic use of manure as fertilizer (forming a rational relationship between the field crops and livestock breeding sectors).
- Liquidating the risk of worsening the environmental, sanitary-epidemiological condition and polluting the ground waters and streams by implementing a proper organic waste management in rural areas based on the use of organic waste as fertilizer for arable soils.
- Increase the production capacity of soils in an area of 200,000 thousand due to improving the physical, chemical and biological characteristics of anthropically degraded soils as a result of organic systemic fertilization with manure.
- Widespread dissemination of technology with consideration of specific pedo-climatic zones and the experience to date with the use of manure as fertilizer.

Preliminary targets for *Vetch field as a green fertilizer into 5 year crop rotation technology*

- Creating prerequisites for implementing sustainable agriculture practices on an area of 200,000 ha by introducing a "field of vetch as green manure (2 yields per year)" in a 5 field crop rotation.
- Improving the soil quality in an area of 200,000 ha, 40 thousand ha annually, by creating a positive balance of humus and carbon, and nitrogen fixation in soil as a result of systemic use of green fertilizer (autumn vetch of *Violeta* variety and spring vetch of *Moldavscaia 82* variety) on an area of 200,000 ha of arable lands.
- Restore the ecological balance in the existing agricultural systems on an area of 200,000 ha by reducing practically total CO₂ and N₂O emissions from soils as a result of biological fixation of carbon and nitrogen by the leguminous crop used as green fertilizer.

¹¹ *Governmental Programme for land revaluation and increase soil fertility for 2003-2010*

Republic of Moldova

- Increase production capacity of the soils in an area of 200, 000 ha as a result of improving physical, chemical and biological characteristics of anthropically degraded soils, as a result of systemic use of green fertilizer.

1.2. Barrier analysis and possible enabling measures for technology *Conservation system of soil tillage without herbicides for winter wheat.*

1.2.1 General description of technology *Conservation system of soil tillage without herbicides for winter wheat.*

Conservation system of soil tillage without herbicides is a sustainable land management practice that contributes to improving soil fertility and structure, adding high amounts of biomass to the soil, causing minimal soil disturbance, conserving soil and water, enhancing activity and diversity of soil fauna, and strengthening mechanisms of elemental cycling¹².

This technology has advantages comparing to conservation tillage with herbicides or conventional tillage.

- Moldboard plug is replaced by combinator, which contributes to the reduction of soil erosion and uncompensated mineralisation losses;
- By reduction of soil erosion and mineralisation losses of soil organic matter we decrease global warming through increased carbon sequestration;
- By reducing the consumption of fuel as a result of replacing the moldboard plow with minimum tillage it is possible to adapt to the limited sources of non-renewable sources of energy, to the fluctuation of prices for non-renewable sources of energy at the international level;
- By keeping mulch on the soil surface it is possible to reduce evaporation of soil moisture and to increase the resistance;
- By using minimum tillage it is possible simultaneously to reduce or to avoid using of mineral fertilizers and pesticides for weed, pest and disease control, which requires a proper soil management system.

The above mentioned advantages allow also to adapt better to the limited sources of non-renewable sources of energy, to the fluctuation of prices for non-renewable sources of energy at the international level, to adapt to global warming by increased carbon sequestration, to increase biodiversity in the soil and on the soil surface through less dependence from mouldboard ploughing and chemicals for pest, disease and weed control etc.¹³.

By using combinator we can replace the moldboard plow or chisel plow. After both of them as a rule disking is done. So, by using combinator we can replace three technological operations by one. After this agricultural work the crop sowing is done

The technology Conservation system of soil tillage without herbicides for winter wheat can be extended to other cultivars, such as sugar beet and sunflower.

Minimum tillage system is studied in the long/term field experiments at the RIFC «Selectia”. Research results are available for farmers through publications of books, recommendations, articles, TV, radio etc. Farmers are visiting experimental plots of the institute with different systems of soil tillage. Each year we organize seminars for farmers at least two times (in the spring, before sowing spring crops, and in the fall before sowing winter cereal crops). During these seminars farmers can see the equipment in operation for minimum tillage in crop rotation.

Economic benefits:

- Increasing the sustainability of the agricultural sector, including profitability
- Reducing the dependence from non-renewable sources of energy and their derivatives (mineral fertilizers and pesticides), which we have to import at the moment and in the future
- Creating conditions for the development of small and medium enterprises

Environmental benefits:

¹² William A.Hayes, 1982. *Minimum tillage farming. No-till Farmer, Inc. ,Brookfield, Wisconsin, 165 p.*

¹³ Young H.M.,1982. *No-tillage farming. No-till farmer, Inc., Brookfield,Wisconsin,165 p.*

Republic of Moldova

- Achieving a more sustainable use of natural resources through preventing soil degradation, soil and water pollution, preservation of biodiversity etc.
- By implementing a conservative system of soil tillage it would be possible to increase the environmental benefits through:
 - Higher carbon sequestration which allows to reduce global warming;
 - Reduction of soil erosion and better storage of soil moisture;
 - Reduction of pollution of ground water with nitrates;
 - Reduction of GHG emission as a result of lower amount of burned fuel.

1.2.2 Identification of barriers to technology transfer

The Adaptation working group (experts/consultants) has considered the technology market characteristics and classified Conservation system of soil tillage without herbicides for winter wheat technology *as a consumer good*, with intention to mass market it, having potential consumers such as private enterprises, research institutions, farmers associations, others.

The identification of barriers has done in a stepwise manner, based on methodological approaches from above mentioned guides.

The working group has identified the barriers to adoption of soil conservation technology in the Republic of Moldova, put efforts to understand why despite their many advantages the farmers rarely apply sustainable agricultural practices in Moldova.

The working group has used **Market Mapping techniques** as a tool for barriers identification and analysis of the challenges the farmers have to cope within the adoption of soil conservation system. The main market actors have been identified and specific barriers they may encounter during technology transfer. The working group has identified a significant number of barriers that impede the widespread adoption of adaptation technology, decomposed them and made specific for each main market actor.

This step was followed by screening of barriers according to their significance to technology transfer and their ranking based on a 1 - 5 scale. A close work with stakeholders' representatives was done in order to reach common agreement on the significance of a particular barrier. After the comprehensive understanding achieved, the experts came up with the List of key barriers that represent the list of essential barriers after non-essential being removed.

Another tool used in the barrier analysis by the working group was **Logical Problem Analysis (LPA)** for analyzing causal relations and core problems in technology transfer. The participants have arranged the problems into a hierarchy of causes and effects having a central starting problem a generic problem for technology transfer. **The LAP Problem Tree** emphasized the main links between causes and effects and organized them into logical interrelations; addressed the basic issues and highlighted linkages with external factors. On the Problem Tree diagram the causes are shown below the starter problem and effects above. The LPA Problem Tree for this and other considered technologies are included in the Annex I.

The results of barriers identification exercise are provided in the tables No 1.2.2.1, 1.2.2.2 and 1.2.2.3 in this sub-chapter.

Table 1.2.2.1. Long List of Barriers to technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology.

Main market actors	Barriers identified		
	Broad categories of barriers	Barriers within category	Detailed barrier description
Farmers	Economic and financial	a. Lack of inadequate access to financial resources	<ul style="list-style-type: none"> ○ Distorted capital market ○ Lack of venture capital ○ Lack of access to credit

		b. High cost of capital	<ul style="list-style-type: none"> ○ Scarcity of cheap capital ○ Government policies on cost
		c. Financially not viable	<ul style="list-style-type: none"> ○ High resource cost of capital ○ High implementation cost ○ High discount rates
		d. Inappropriate financial incentives and disincentives	<ul style="list-style-type: none"> ○ Insufficient incentives to develop climate technologies ○ Non-consideration of externalities ○ Taxes on climate technologies
		e. Uncertain macro-economic environment	<ul style="list-style-type: none"> ○ Volatile inflation rate and high price fluctuation ○ Unstable currency and exchange rates ○ Balance of payment problems and uncertain economic growth
	Market failure, imperfection	a. Poor market infrastructure	<ul style="list-style-type: none"> ○ Poorly articulated demand ○ Missing or under-developed supply channels ○ Disturbed or non-transparent markets
		b. Underdeveloped competition	<ul style="list-style-type: none"> ○ Insufficient number of competitors
		c. Restricted access to technology	<ul style="list-style-type: none"> ○ Problems with import of technology or equipment
		d. Inadequate sources of increasing returns	<ul style="list-style-type: none"> ○ Economies of scale only at high investment level ○ Market size small ○ Low ability or willingness to pay among consumers
	Policy, legal and regulatory	a. Insufficient legal and regulatory framework	<ul style="list-style-type: none"> ○ Absence of laws and bylaws on climate technologies ○ Lack of government faith in climate technologies ○ Inadequate or unwieldy regulations for climate technologies ○ Lack of coherent economic policies.
		b. Inefficient enforcement	<ul style="list-style-type: none"> ○ Insufficient willingness or ability to enforce laws and regulations.
		c. Policy intermittency and uncertainty	<ul style="list-style-type: none"> ○ Lack of long-term political commitment ○ Stability of laws (frequent amendments)
		f. Red tape (bureaucracy)	<ul style="list-style-type: none"> ○ Corruption and bureaucracy are contributing to unsustainable development of the agricultural sector.
Network failures	a. Weak connectivity between actors favoring the new technology	<ul style="list-style-type: none"> ○ Stakeholders dispersed and poorly organized ○ Multiple stakeholder collaborative learning and knowledge transfer activities absent or weak ○ Insufficient coordination between relevant ministries and other stakeholders ○ Insufficient cooperation between 	

			industries and R and D institutions
			<ul style="list-style-type: none"> ○ Absence of trade associations and effective consumer bodies
	Institutional and organizational capacity	b. Lack of involvement of stakeholders in decision making	<ul style="list-style-type: none"> ○ Stakeholder consultation culture missing ○ Difficult communication. ○ Fear opposition
		a. Lack of professional institutions	<ul style="list-style-type: none"> ○ The lack of institutions to promote and enhance market
	Human skills	b. Limited institutional capacity	<ul style="list-style-type: none"> ○ Lack of interest or capacity in existing institutions ○ Limited R & D culture (lack of appreciation of R & D role in technology adaptation)
		c. Lack of skilled personnel for the installation and operation of climate technologies	<ul style="list-style-type: none"> ○ Lack of entrepreneurs (relatively ○ Lack of service and maintenance specialists
	Social, cultural and behavioral	a. Consumer preferences and social biases.	<ul style="list-style-type: none"> ○ High discount rates on consumers
		b. Traditions and habits	<ul style="list-style-type: none"> ○ Resistance to change, due to cultural reasons
		c. Lack of confidence in new climate technologies.	<ul style="list-style-type: none"> ○ Unknown product, due to inadequate information, lack of local participation
	Information and awareness	a. Inadequate information	<ul style="list-style-type: none"> ○ Poor dissemination of information to technology users ○ Poor infrastructure for communication of small-scale project support.
b. High risk perception of climate technologies, c. Language, d. Feedback mechanism lacking or inadequate, e. Lack of awareness about issues related to climate change and technological solutions		<ul style="list-style-type: none"> ○ Uncertain benefits ○ High investment risks ○ Perception of complexity 	
Technical	a. Poor O & M facilities	<ul style="list-style-type: none"> ○ Lack of skilled personnel ○ Slow after-sales services ○ Limited availability of spare parts ○ Need to import spare parts 	
Research Institutions and Universities involved in researches	Economic and financial	a. Lack of inadequate access to financial resources	<ul style="list-style-type: none"> ○ Lack of access to credits
		b. High cost of capital	<ul style="list-style-type: none"> ○ Scarcity of cheap capital ○ Government policies on cost of capital

			(high tax on profit)
		c. Financially not viable	<ul style="list-style-type: none"> ○ High resource costs ○ High implementation costs ○ High discount rates ○ Use of payback time criterion limits consideration of overall economic lifetime benefits
		d. Inappropriate financial incentives and disincentives	<ul style="list-style-type: none"> ○ Insufficient financial incentives to develop climate technologies ○ Non-consideration of externalities. ○ Taxes on climate technologies (high import duties on equipment)
		e. Uncertain macroeconomic environment	<ul style="list-style-type: none"> ○ Volatile inflation rate and high price fluctuations ○ Unstable currency and exchange rates ○ Balance of payment problems and uncertain economic growth
	Market failure imperfection	a. Poor market infrastructure	<ul style="list-style-type: none"> ○ Poorly articulated demand ○ Missing or under developed supply channels (e.g. logistic problems) ○ Disturbed or non-transparent markets
		b. Underdeveloped competition	<ul style="list-style-type: none"> ○ Insufficient number of competitors (property developers and rental market have no incentive to invest)
		c. Restricted access to technology	<ul style="list-style-type: none"> ○ Problems with import of technology or equipment due to restrictive policies, taxes etc.
	Policy, legal and regulatory	a. Inefficient enforcement	<ul style="list-style-type: none"> ○ Insufficient willingness or ability to enforce laws and regulations
		b. Policy intermittency and uncertainty	<ul style="list-style-type: none"> ○ Lack of long-term political commitment ○ Stability of laws (frequent amendments)
	Network failures	a. Weak connectivity between actors favoring the new technology	<ul style="list-style-type: none"> ○ Stakeholders dispersed and poorly organized ○ Multiple stakeholder collaborative learning and knowledge transfer activities absent or weak ○ Insufficient coordination between relevant ministries and other stakeholders ○ Insufficient cooperation between industries and R and D institutions ○ Absence of trade associations and effective consumer bodies
		b. Lack of involvement of stakeholders in decision making	<ul style="list-style-type: none"> ○ Stakeholder consultation culture missing ○ Difficult communication ○ Fear of opposition
	Institutional and organizational capacity	a. Lack of professional institutions	<ul style="list-style-type: none"> ○ The lack of institutions to promote and enhance market
		b. Limited institutional capacity	<ul style="list-style-type: none"> ○ Lack of interest or capacity in existing institutions ○ Limited R and D culture (lack of appreciation of R and D role in

Republic of Moldova

			technology adaptation)
	Human skills	<p>a. Lack of skilled personnel for the installation and operation of climate technologies</p> <p>b. Weak response of scientific community to agricultural research needs</p>	<ul style="list-style-type: none"> ○ Lack of service and maintenance specialists. ○ Lack of motivation for researchers to produce innovator products
	Social, cultural and behavioral	<p>a. Consumer preferences and social biases</p> <p>b. Traditions and habits</p> <p>c. Lack of confidence in new climate technologies</p>	<ul style="list-style-type: none"> ○ High discount rates on consumers. ○ Resistance to change, due to cultural reasons. ○ Unaccepted unknown product due to inadequate information, lack of local participation.
	Technical	<p>a. Poor O and M facilities</p>	<ul style="list-style-type: none"> ○ Lack of skilled personnel ○ Slow after-sales services ○ Limited availability of spare parts. ○ Needs to import spare parts.

Due to the fact, that all three technologies prioritized in Agriculture sector refer to soil practices, and generic barriers have many common elements, explanatory details of barriers will be provided for soil conservation technology, while for the other two technologies, the presentation of barriers will be more concise, paying attention to technology specific information.

After categories and barriers identified and details given in the table No 1.2.2.1, more explanations provided for barriers identified in the text below.

1.2.2.1 Economic and financial barriers

Economic and financial

Some of the commonly mentioned economic factors holding farmer from adoption are the cost of adopting, the uncertainty of profitability, and loss of productivity, labor demand, short term economic necessity, and economic policies. Although it has been demonstrated that sustainable practices are as economically viable as conventional practices, profitability of sustainable practices is a concern among farmers and even change agents.

Commercial banks of Moldova have relatively high capitalization, but lending is based on the principle of economic profitability. Thus, the interest rate on loans provided to entrepreneurs for operational activities is 20-24% annually, including commission rates. This implies that economic activity should have a return of at least 40-45% in order to repay the loan on time. For economic activity in agriculture this is a problem difficult to overcome. Moreover, until now no commercial banking institution in the country does favors lending to agricultural enterprises without having the support through international credit lines (RISP, SIDA, and DFID).

Access of small producers to available financial resources of small banks and credit organizations is more difficult. The pledge given to credit institutions should not be less than 85% of the loan amount. This is often the biggest impediment for small producers.

Another problem with the farmers' limited access to available financial resources is the refusal of commercial banks to accept as agricultural land as a pledge. This happens due to the absence of a legal framework in this area.

In the Republic of Moldova only 4-5% of agricultural land is secured, resulting in increased risk to economic profitability. This is the case when land is affected by rain, droughts, etc.

Republic of Moldova

Lack of a banking institution or Land Banks that would provide bank to farmers accepting land as a pledge explains the lack of interest from foreign investors for agricultural activities.

Another barrier to adoption is change of equipment; this increases the initial cost and makes adoption more difficult. When adopting a sustainable practice requires a change in equipment or simply discarding old equipment, this represents a barrier for farmers to adoption of the new practice.

The capital market is not sufficiently developed. Financial instability doesn't allow promoting long-term credits at lower rates of interest. Credits are released through commercial banks which are interested in short-term crediting. The issue of crediting is very complex and it supposes financial stability and less dependence from the international market on inputs (oil, fertilizers, pesticides, agricultural equipment, seeds etc.).

Moldova is an agricultural country, dependent from the imports of renewable sources of energy. Simultaneously the dependence of the fluctuations of prices for agricultural products in the international market is very high. High prices for inputs and relatively low prices for agricultural products are limiting the access to credits.

In order to improve the existing situation with crediting in agriculture of Moldova for the implementation of climate technologies it would be advisable to:

- Establish criteria for the evaluation of farm activities, which should include not only economic parameters (profit, yields), but also ecological and social parameters, which usually are externalized.
- Farmers which are implementing environment friendly technologies should be supported by the state through subsidies, reduced taxes for imported equipment used for climate technologies.

For research Institutions and higher education institutions conducting research the barriers are quite similar to farmers because they have similar economic and financial situation. Financial support from the state doesn't allow buying new equipment, including for climate technologies. Nevertheless research institutions have the human and intellectual capacities to promote new technologies. There is an urgent need in on-farm researches, where farmers can cooperate with science in order to promote new ideas on climate technologies.

High cost equipment, high per cent of bank interest can be reduced by subsidies from the state, decreasing the import taxes etc. New climate technologies have to be studied in the long-term field experiments, which also require state support.

Market failure imperfection barriers

Moldova's agricultural market by its specificity (area) is limited, where monopoly is inevitably formed by fluidization of two or more major producers. These combinations lead to group interests and cartel agreements which set wholesale and retail prices. So most producers sell their output at prices set by the market or is forced to sell it to wholesalers. This is the weak link in an agricultural production value chain. Agricultural producers sell their products below the level of break even point and thus incur financial losses and lack of capitalization for the agricultural enterprises.

In the agricultural operation only producers having large areas (more than 50ha) or those who cultivate value added crops can achieve the effect of economy of scale (non-operational costs per product unit remain unchanged). The most part of producers this effect cannot be achieved.

Current practice shows that agriculture is the branch with the lowest level of implementing agricultural technologies. This is the reason for the low competitiveness of domestic products on the regional market and a reduced supply over demand.

Lack of financial resources available to producers forces the processors to contract the necessary amount of products on the account of future production. Purchase prices are often to the detriment of producers and the latter are deprived of the possibility to maneuver the local or regional markets, depending on the price.

Moldova's agricultural market is open, so the market players are both the domestic and external ones, and agricultural products is appreciated by the consumer primarily based on price and quality. The most straightforward desire is "low price and good product." By these criteria the production of domestic producers is not competitive. Access to market in Moldova should be higher for a larger number of companies in order to increase competition, which can determine the price and influence the quality.

The import of equipment should be accompanied by services (supply channels) for parts and for fixing machines. At the moment equipment is imported mainly for large farms, which can afford to buy expensive agricultural machines. Small

Republic of Moldova

scale farms also need access to equipment with lower investment. The Government, the Ministry of Agriculture should determine the policy for rural development, social issues in rural communities.

For Research Institutions. Lack of a good supply channels (logistic) and lower access to the market of a limited number of producers of agricultural equipment are not favorable for agricultural producers.

1.2.2.2 Non financial barriers

Policy, legal and regulatory barriers

Moldova has adopted the "Code of Good Agricultural Practices", but no mechanism for the implementation of good agricultural practices. Natural resources are not estimated until now in the existing system for the evaluation of the farm activity. The negative consequences of human activities are externalized. There are no incentives for the implementation of environmental friendly technologies.

Short-term economic interest is dominated under the long-term economic interests. In order to promote sustainable agriculture it would be necessary first of all to work out the Law of Soil and to stimulate services provided by farmers for society and environment.

Financial instability, lack of long-term political commitment, insufficient willingness and ability to enforce laws and regulations, corruption and bureaucracy are contributing to unsustainable development of the agricultural sector.

The Law of Soil must be promoted by the Parliament of Moldova in order to reduce /to limit the negative consequences of conventional agriculture to the environment. A whole state service is required for the monitoring the state of soil fertility without taking in consideration the farm size and forms of land ownership.

Network failures barriers

Lack of holistic (systemic) approach is causing many problems at the different level of management.

Research- agricultural business collaboration does not realize its full potential. Level of contact and communication between these two actors is very low.

Instead of coordination of their efforts, different ministries are working alone; even compete in fundraising for the same topic. Ministry of Agriculture and Ecology should coordinate closer and deeper their efforts in environmental protection. The extension service is missing in Moldova. No integration between research, extension and educational works.

One of the main incentives for promoting climate technologies should be high demand of high quality products on behalf of consumers. Unfortunately the level of education for consumers concerning the quality of food isn't enough. Civil society isn't enough involved in decision making regarding what kind of technologies to promote. Big companies are promoters of new technologies, which are profitable, but not sustainable.

By extending researches in the long-term field experiments at the research institutions and on-farm researches it would be possible to increase the collaborative learning and knowledge transfer. Farmers should learn from each other during the seminars or field days. Such seminars should be supported by different ministries responsible for agriculture, environment, health etc.

According to the latest estimates 40% of medium size farmers and 60% of small farmers are not representative in any way that is not part of any association of producers. Their needs and wishes practical are not heard and their interests are often confused with those of large producers.

A common platform between different ministries should be established regarding sustainable use of natural resources.

Institutional and organizational capacity barriers

Researchers should be involved in doing research and together with extension service to promote climate technologies. Research institutions don't have enough support to do research, because of poor dotation with modern equipment. Climate technologies should be evaluated in the long-term field experiments taking into consideration their relevance to slow changes in soil fertility.

Research, extension and educational activities have to be coordinated properly in order to suit to the requirements of the present day. Lack of interest to support local research institutions doesn't allow promoting new climate

Republic of Moldova

technologies. More than this, at the state level there is an urgent necessity in interdisciplinary research programs, because the complexity of problems can't be decided in the frame only of one institution. Lack of research, including agricultural science will increase the problems which agriculture is facing nowadays. No deficit of scientific recommendation at the moment. There is a deficit of political willingness to use such recommendation.

The poor liaison between research, academia and agricultural business creates big gaps in technology transfer. This situation creates reluctance of the research community to respond to agriculture sector technology needs.

Human skills barriers

One of the reasons for non-adoption reported by Norman et al. (1997)¹⁴ is that sustainable agriculture practices are management intensive and require great commitment to constant learning. The intellectual cost of adopting environmental innovations is usually greater than conventional innovations because they require a better understanding of farm systems, cropping systems, or chemicals

Labor productivity of agricultural employees is the lowest, compared to other sectors of the economy. One of the factors of influence is the absence of skills and discipline. However, there are already several organizations providing training and computer science education to agricultural employees, but the participation rate is very low.

Possibilities for increasing the ability of specialists to understand modern technologies exist, but they have to be improved by training courses in the country and abroad. By increasing the access to climate technologies it should be established a service for the maintenance of new equipment.

Social, cultural and behavioral barriers

About 30% of the population is employed in agriculture. This rate has a negative impact on rural development. Lack of other activity results in excessive labor force and the risk of low productivity at agricultural enterprises.

Consumers do not appreciate the quality of food. Prices are the main criteria for their choice. Educational work is crucial for changing the attitude of consumers to the quality of food. Consumer associations can assist in great extent and simultaneously producer association can contribute to the promotion of new climate technologies.

The new association between producers and consumers can cut the distance between them by increasing simultaneously the economic interest and by reducing the risk for producers in agriculture. We should learn from the experience of community supported agriculture in different countries (the Netherlands, France, and Germany).

Producers and consumers should cooperate through local markets, community supported agriculture, certification and marketing of ecological products etc. Children in the schools people in hospitals should use ecological certified food. Educational work is crucial here.

Information and awareness barriers

An externalization of the consequences of conventional agriculture on the environment and the health of people is one of the main obstacles in promoting new technologies.

New criteria (economic, social and environmental) should be used for the evaluation of farm activity and for promoting environmental friendly farming systems. Promoting new technologies is risky and without support farmers will not take this risk. The main problem here as before is that the state policy should be oriented to support the good services provided by farmers to the environment and society (avoiding soil and water degradation and pollution).

Technical barriers

In order to promote climate technologies the logistic should be organized in different districts for providing good technical services (spare parts, fixing etc.). Moldova lacks technology consultancy centers that operate at a ground / community level in the agriculture sector.

¹⁴ Norman, David, Rhonda Janke, Stan Freyberger, Bryan Schurle, and Hans Kok. 1997. "Defining and Implementing Sustainable Agriculture." *Kansas Sustainable Agriculture Series*, 1:1-14. Retrieved March 15, 2004 (www.kansassustainableag.org/Pubs_ksaac/ksas1.htm).

Table 1.2.2.2. List of barriers and hierarchy classification

S No	Barriers identified	Rank (1-5)	Classification of the barriers (economic, financial, human capacity, awareness, institutional regulatory etc.)
1.	Lack of inadequate access to financial resources	5	Economic and financial
2	High cost of capital	5	Economic and financial
3	Inappropriate financial incentives and disincentives	5	Economic and financial
5.	Poor market infrastructure	5	Market failures
6	Insufficient legal and regulatory framework	5	Policy, legal and regulatory
6.	Inadequate sources of increasing returns	4	Market failures
7.	High interest rates	4	Economic and financial
8.	Policy intermittency and uncertainty	4	Policy, legal and regulatory
9.	Inadequate information	4	Information and awareness
10.	Weak connectivity between actors favoring the new technology	4	Network failure
11.	Lack of involvement of stakeholders in decision making	2	Network failure
12.	Inefficient enforcement	3	Policy, legal and regulatory
13.	High risk perception of climate technologies	3	Information and awareness
14.	Lack of awareness about issues related to climate change and technological solutions	1	Information and awareness

Table 1.2.2.3. The List of Key Barriers to technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology.

Key barriers identified	Classification of the barriers
Lack of inadequate access to financial resources	Economic and financial
High cost of capital	Economic and financial
Inappropriate financial incentives and disincentives	Economic and financial
High interest rates	Economic and financial
Poor market infrastructure	Market failures
Inadequate sources of increasing returns	Market failures
Weak connectivity between actors favoring the new technology	Market failures
Insufficient legal and regulatory framework	Policy, legal and regulatory
Policy intermittency and uncertainty	Policy, legal and regulatory
Inadequate information	Information and awareness

1.2.3 Identified measures to overcome barriers to technology transfer of Conservation system of soil tillage without herbicides for winter wheat.

Next step for the second phase of the TNA Project was the identification of measures needed to overcome identified barriers and to improve each technology performance. The working group has discussed the impact of policy options on technology. The results of this common work are provided in the tables No 1.2.3.1, 1.2.3.2, 1.2.3.3 and 1.2.3.4 of this sub-chapter.

Logical Problem Analysis was used as a tool to identify the measures to overcome the barriers. The experts have prepared sector specific information, policy documents, and other useful information for discussions during the meetings with stakeholders. The working group discussed the measures in the context the barriers were addressed, grouping by the same criteria as barriers. The problems were reformulating into positive statements about future situations, arranging measures and results into the **Objective tree** as logically organized presentation of objectives. The Objective tree of this and other technologies are presented in the Annex I.

The measures were assessed according to their economic profile, incentives used and effects achieved. The results are presented in the tables below.

The Conservation system of soil tillage without herbicides for winter wheat technology has been supported by the study of policy enabling environment. Developed **Policy Fact Sheet (PFS)** of this technology with compressed information about policy framework is presented in the Annex III. According to the investigations done by experts in the implementation of the technology falls under the jurisdiction of several laws promoting sustainable development and environmental protection, among which the most important are:

- Promoting sustainable farming systems in the Republic of Moldova¹⁵.
- Law on ecological products.¹⁶
- Law on Drinking Water¹⁷.
- Law on Environmental Protection¹⁸.

Working groups have considered that the highest impact with direct effect on technology implementation has the law on **Promoting sustainable farming systems in the Republic of Moldova**. The related regulatory acts complement the main law, contributing to a policy and regulatory path for implementing the technology.

The experts have undertaken a **cost-effective analysis** of the political path supported by the specific law that shall ensure the successful implementation of the technology and obtaining the best value of money. The scenario includes long-term operation for adoption of sustainable practices of soil conservation. This technology is aimed at preserving organic composition of soil and soil erosion by applying no-tillage system by optimizing processing work. Thus, the no-tillage system can help lower costs of diesel and oil, labor remuneration and other expenses related to wheat cultivation by 4 times. Application of this technology is provided in full for the total area sown with winter wheat in the country, approx. 340,000 ha. Its applicability can be easily done at farm type and level of farmer households. Agricultural machinery needed was provided in relation to 1:100 ha. Such ratio will allow the exploitation of agricultural equipment for over 10 years. The area that refers to a machine will offer great opportunities for producers, technology machines resorts, but also small peasant farms to buy this machine under different modes: credit, leasing, financial consortium. In the tables of this compartment we provide forecasting costs presented for each particular year of no-tillage system compared to the traditional system.

Based on the calculations of **economic-financial analysis** we can conclude that the application of no-tillage system under long-term exploitation is more effective given the relatively low costs compared to the traditional system. Calculations and developed **Policy Fact Sheet (PFS)** of this technology with compressed information about policy framework are provided in the Annex III.

¹⁵ Promoting sustainable farming systems in the Republic of Moldova, 2005 www.maia.gov.md

¹⁶ Law N 115-XVI regarding the ecological production from 09.06.2005 www.maia.gov.md

¹⁷ Nr.1532 Water Code of June 22, 1993 <http://www.apelemoldovei.org/nationallaw.html>

¹⁸ Environmental Protection Act 1515 of June 16, 1993 <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=311604>

Table 1.2.3.1. The List of barriers and measures to technology transfer of *Conservation system of soil tillage without herbicides for winter wheat technology.*

Barriers identified	Measures identified to overcome the barriers
Economic and financial	<ul style="list-style-type: none"> ○ To decrease the interest rate for credits released by commercial banks. To encourage creation of agricultural banks with low rate of interest. ○ To reduce or to avoid taxes for profit for farmers investing in good agricultural practices, including procurement of equipment. ○ To ask for higher discount rates for climate technologies from companies which are producing agricultural equipment? ○ To release subsidies for farmers implementing climate technologies. ○ To take into consideration the negative externalities (pollution, soil degradation) from the conventional farming system relatively to conservation farming system. ○ To reduce taxes for the import of climate technologies.
Market imperfection	<ul style="list-style-type: none"> ○ To develop the logistics for the procurement by agricultural producers of equipment for climate technologies. ○ To increase the access to the local market of different producers of agricultural equipment. This can increase competition and decrease prices. ○ To reduce restrictive policies for importing technology and equipment, to reduce import taxes.
Policy, legal and regulatory	<ul style="list-style-type: none"> ○ To adopt the law and bylaw on climate technologies. ○ To reduce taxation for forms which are promoting climate technologies? ○ To enforce the promotion of climate technologies through subsidies for respecting good farming systems
Network failure	<ul style="list-style-type: none"> ○ To organize national and regional networking groups for farmers interested in promoting climate technologies. ○ Organizing seminars for farmers interested in innovative farming systems with a better coordination activities between stakeholders and ministries R and D institutions, machinery producers, involving producers in decision making. ○ The foundation of a consumer association in order to make a connection between agricultural producers and policy makers, to do lobby for a sustainable system of food production.
Information and awareness	<ul style="list-style-type: none"> ○ Creation of an extension service including on issues related to innovative climate technologies. ○ Increasing media interest in promoting climate technologies with larger participation of researcher, consultants and producers; more information about the positive influence of climate technologies.
Human skills	<ul style="list-style-type: none"> ○ Strengthen human capital base in the Agriculture sector.

Republic of Moldova

Table 1.2.3 2. The list of measures, their economic profile, incentives used and their effects.

S No	Measure	Economic profile	Incentive	Effect	
				Paid by the government	Paid by utilities
1	Subsidies for farmers implementing climate technologies and environmentally friendly farming systems	High initial investment from the state budget	Enforcing to respect a sustainable farming system	Increase the financial stability of the farm	Increase the efficiency of agricultural production economic growth, trade balance and employment
2	Reduction of the import taxes for new technologies	No cost for the state	Increased access to the local market of different companies producing agricultural equipment	Increase the fiscal budget of the state	Reduce the economic growth trade balance, employment
3	Extending a research program on conservation tillage	High initial investment	Extending the beneficial influence of good farming practices on the environment and the health of people	Improving the economic situation of farms: economic growth; trade balance and employment	Improving the economic growth, trade balance and employment

Table 1.2.3.3. Categories of measures and incentives

Financial measures	Non-financial measures	Complementary measures	Incentives
Subsidies for farmers implementing climate technologies and environmentally friendly farming systems.	Enforcing Implementing of climate technologies through subsidies	Avoiding taxes on profit for farmers implementing good agricultural practices Decreasing the interest rate for credits released for farmers practicing good agricultural practices.	To stimulate using of resource conserving agriculture at least by 50% of agricultural producers in 2020. This will allow to: <ul style="list-style-type: none"> ○ Reduce soil degradation by erosion ○ Decrease fuel consumption for soil tillage ○ Reduce desertification of territory. ○ In order to receive subsidies farmers have to respect the whole farming system, but not only some of the component parts.
Reduction of the import taxes for new technologies.	Increasing the access to the local market of different producers of	Development of logistics for the procurement and service for new equipment.	This will stimulate together with the above mentioned measures the adoption of climate technologies by implementing them on 50% of the area until 2020

Republic of Moldova

	agricultural equipment.		
Extending a research program on conservation tillage.	Increasing media promotion of conservative systems of soil tillage.	Training of extension officers. Organizing of national and regional networking groups in promoting climate technologies. Foundation of a consumer association.	Research on environmental friendly technologies will stimulate their acceptance by farmers in different regions of Moldova.

Table 1.2.3.4. The Final List of measures to overcome barriers to technology transfer of Conservation system of soil tillage without herbicides for winter wheat technology.

S.No.	Measures
1	To encourage creation of agricultural banks with low rate of interest.
2.	To reduce/ avoid taxes for profit for farmers investing in good agricultural practices, including procurement of equipment.
3	To reduce taxes for the import of climate technologies.
4	Developing a system of economic incentives for agricultural enterprises that use manure as fertilizer
5.	To release subsidies for farmers implementing climate technologies
6	To develop the logistics for the procurement by agricultural producers of equipment for climate technologies
7.	To reduce restrictive policies for importing technology and equipment, to reduce import taxes.
8.	Increasing media interest in promoting climate technologies with larger participation of researcher, consultants and producers; more information about the positive influence of climate technologies.
9.	To organize national and regional networking groups for farmers interested in promoting climate technologies.
10.	The foundation of a consumer association in order to make a connection between agricultural producers and policy makers, to do lobby for a sustainable system of food production.
11.	Strengthen human capital base in the Agriculture sector.

1.3. Barrier analysis and possible enabling measures for Vetch field as green fertilizer into 5 year crop rotation technology.

1.3.1 General description of Vetch field as green fertilizer into 5 year crop rotation technology.

Climate aridization along with classic cultivation leads to dehumification of agricultural soils, soil structure damage and strong secondary compaction of the arable layer. Currently the arable layer of agricultural soils lost its natural ability to

Republic of Moldova

compaction resistance. Dehumification, dissolution and secondary arable soil compaction is a global problem¹⁹, but particularly acute in Moldova where 80 percent of soils are characterized by fine texture²⁰. These soils have a high production capacity only if their structure is agronomical favorable and contributes positively to regulate air-fluid and nutrient regimes, ensuring optimal conditions for plant growth and development. In a compacted layer of soil moisture reserves are almost by two times less accessible than in the same loose layer with agronomical favorable structure. Therefore, soils with a high content of humus, agronomical favorable structure and loose arable layer are more adapted to climate change. To adapt to increasing desertification due to dehumification, dissolution and secondary compaction of the arable layer of soil generated by climate change, 6 technologies described below are recommended.

The advantages of this technology are: common tillage habits; total incorporation vegetal waste, weeds and their seeds; reliability due to the simple construction of the plug; soil loosening effect (intensive mobilization of soil fertility, complete assurance of crops with nitrogen for 4 years due to return into the soil of about 400kg/ha of nitrogen with vetch vegetal waste; significant rehabilitation of physical quality of the soil, biological improvement of the soil. Two crops of vetch per one agricultural year accumulate about 20 t / ha of dry organic matter in the soil which ensures synthesis of 5 t / ha of humus or 2.9 t / ha of carbon. It develops a balance of humus, carbon, nitrogen and CO₂ emissions from soil. The technology can be successfully implemented by all agricultural businesses on cca 200-400 thousand ha during 5-10 years, on each field in crop rotation every year, the total area is 40 000 ha / year. This amount of humus is sufficient to create a positive carbon and nitrogen balance in soil during 5 years. The arable layer will become structured, loose, will contribute to a favorable air-fluid and nutrient regime and will increase the plants resistance to drought. Technology entails environmental friendliness of agriculture, more effective use of water and nutrients from the soil.

This technology can be successfully implemented on all agricultural lands of farmers. It can be implemented under any land cultivation system. In order to implement this technology, it is necessary to create the autumn and spring vetch seed production operation. The autumn vetch shall be planted, as appropriate, in late August or early September and spring vetch – in early May of the next year after incorporation of autumn vetch mass into the soil.

Environmental benefits. It stops soil degradation, makes the humus and soil carbon balance positive or well-balanced, cardinaly improves the soil biota status, increases resistance of soil to pollution and of plants to drought.

Social-economic benefits. The social - economic effect of this technology implementation will be the following: it will increase the turnover and quality of agricultural production on arable soils, well-being of rural population, decrease migration, create the economic prerequisites for projects to improve the ecological status of villages.

1.3.2. Identification of barriers to technology transfer.

The Adaptation working group has considered the technology market characteristics (high number of potential consumers, dealing with direct wants and needs of consumers, demand depends on consumer awareness, preferences, other) and classified Vetch field as a green fertilizer into 5 year crop rotation technology *as consumer good* with intention to mass market it, having potential consumers such as private enterprises, State agencies, research institutions, farmers associations.

The approaches and methods used in the identification and analysis of the barriers were similar to those described in *the Conservation system of soil tillage without herbicides for winter wheat* technology. In *Vetch field as a green fertilizer into 5 year crop rotation* technology the descriptions of barrier elements are concisely presented in the *Detaied barrier description* of the table No 1.3.2.1.

The results of the undertaken analysis are presented in the tables No 1.3.2.1., 1.3.2.2 and 1.3.2.3 of this sub-chapter.

¹⁹ Guj P., Rusu T., Bogdan I. *Asolamentele, rotația culturilor și organizarea teritoriului. Cluj-Napoca: Risoprint, 2004. 219 p. ISBN 973-656-566-1*

²⁰ Cerbari V., Scorpan V., Țăranu M., Bacean I. *Remediarea stării de calitate și capacității de producție a cernoziomurilor obișnuite din sudul Moldovei sub influența unor măsuri fitotehnice. În: Mediul Ambient. Nr. 1 (61), Februarie, 2012. p. 38- 43. ISSN 1810-9551*

Table 1.3.2.1. The Long List of Barriers to technology transfer of Vetch field as green fertilizer into 5 year crop rotation technology.

S. No	Actors on the market	Identified barriers			
		Wide categories of barriers	Barriers within the category	Barrier elements	Detailed barrier description
1	Ministry of Agriculture and Food Industry Ministry of Agriculture and Food Industry	Legislative	Unconditional terms of leasing agricultural lands.	Lack in the Land Code of provisions about the lessor's responsibility for the quality of the leased soil, in the chapter on lease of agricultural lands.	Unconditional terms of leasing agricultural lands to businesses entail lack of responsibility from the latter for maintaining the soil quality on a long term basis. The law does not stipulate: <ul style="list-style-type: none"> ○ Responsibility of the farmer for the soil quality; ○ Control mechanism.
		Economic and financial	Lack of financial possibility to create a fund for stimulation of agricultural businesses which use green fertilizer.	There are no resources to create the fund because of low profitability of agriculture.	Small harvests, low prices for agricultural products purchased from producers .
		Regulatory	Lack of seeds	Local seed producers are not protected	Lack of the necessary reserve of vetch seed needed to organize a large-scale seed production. Annual need for vetch seed for 40 thousand ha: Autumn - 3200t; Spring - 4000 t
			Excessive fragmentation of land.	The process of agricultural land consolidation is too slow	<ul style="list-style-type: none"> ○ Excessive fragmentation of land and the need to consolidate it into farms with optimal surface for crop rotation schemes and implementation of technology. ○ Slow implementation of land consolidation projects.
		Market failures	Undeveloped market	<p>a. Imbalance between agricultural production and prices for equipment, fertilizer and fuel.</p> <p>b. The absence of market prices for the environmental benefits of soil</p>	<p>Low prices for agricultural products purchased directly from producers and high prices for equipment, fertilizers and fuel.</p> <p>There is no price for environmental benefits, usually this type work is perceived as voluntary work or is masked in other conventional works.</p>

Republic of Moldova

				improvement works.	
		Network failures	Weak connections between actors	Large number of agricultural businesses, dominance of subsistence rather than market agriculture.	The process of developing market agriculture is too slow and, therefore, difficulties in connecting and fostering strong relationships between businesses in agriculture, purchases and traders of agricultural production and equipment.
		Institutional and organizational capacity	Lack of expertise in organizing and promoting market agriculture.	Lack of expertise in organizing and promoting market agriculture.	Insufficient training of specialists in this domain.
		Technical	a. Weak institutional and organizational capacity of the government, professionals and businesses in agriculture. b. Lack of standards and codes, poor quality products, lack of operation and maintenance.	Poor performance in standardization of agricultural products, poor quality control of agricultural products.	There is no a national level hierarchically organized single standardization and quality control system of agricultural product quality.
2	Municipalities	Regulatory	Lack of legislation that would require the local public administration to be accountable for the soil condition.	The Regulations on municipality activity does not feature the obligation for maintaining soil quality.	<ul style="list-style-type: none"> ○ Indifference of the local public administration for the condition of the communal land soil quality. ○ The cadastral service within municipalities is not responsible for soil quality protection.
			Lack of interest from the mayors in promoting green technologies.	This obligation is not specified and staffed.	<ul style="list-style-type: none"> ○ Non-involvement of municipalities in the process of improving and implementation by agricultural businesses of advanced technologies to protect the soil fertility. ○ Municipalities lack the agronomic service.
		Information and	Lack of skilled local agricultural specialists.	Lack of local extension centers.	Unawareness of the relevant local public administration and the local population of the need to have an organic matter flow

Republic of Moldova

		awareness			in soils to maintain the quality and production capacity.
3.	Agricultural businesses	Economic and financial	Inadequate pricing of agricultural products and equipment.	Lack of policies protecting and supporting domestic producers.	Lack of funds to purchase vetch seeds and special equipment to chop and incorporate green fertilizer into the soil.
		Human skills	Lack of interest from businesses for improving the quality of the soil.	There is no mechanism to assess the soil quality before and after the lease.	<ul style="list-style-type: none"> ○ The indifference of agricultural businesses leasing land for a short-term or unpredictable period about the condition of soil quality. ○ There are no soil quality indicators that can be used to assess the quality of soils.
		Information and awareness	Insufficient knowledge among agricultural businesses	Lack of training centers for agricultural enterprises staff	<ul style="list-style-type: none"> ○ There is a need to set up three regional training centers for agricultural staff. ○ Unawareness by most agricultural businesses that only an optimal ratio of organic and chemical fertilizers in the soil can ensure high productivity of crops.
			Poor knowledge among rural population about the significance of soils in sustainable agriculture.	Lack of locale extension centers	<ul style="list-style-type: none"> ○ The mentality of rural population believing that agricultural production has to be used for its direct purpose rather than incorporated into the soil as green fertilizer. ○ Local extension centers are needed in each municipality.
		Social, cultural and behavioral	Lack of confidence in sustainable technologies.	<ul style="list-style-type: none"> ○ Lack of knowledge-intensive approach. ○ Lack of transparency 	<ul style="list-style-type: none"> ○ There is need in knowledge-intensive approach and the use of advanced technologies. ○ Lack of transparency and poor work of regulatory institution responsible for implementation of sustainable technologies.

Table 1.3.2.2. List of barriers and hierarchy classification

S No	Barriers identified	Rank (1-5)	Classification of the barriers (economic, financial, human capacity, awareness, institutional regulatory etc.)
1.	Scarcity of investment capital	5	Economic and financial
2.	Lack of funding for vetch seed stock development	5	Economic and financial
3.	Excessive fragmentation of land/ Small farm size	5	Economic and financial
4.	Inadequate rural infrastructure and tenurial arrangements	5	Economic and financial
5.	Lack of financial possibility to create a fund for stimulation of agricultural businesses which use green fertilizer	4	Economic and financial
6.	Poor market infrastructure	5	Market failures
7.	Insufficient legal and regulatory framework	5	Policy, legal and regulatory
8.	Policy intermittency and uncertainty	4	Policy, legal and regulatory
9.	Indifference of local public administration about the quality of communal soils.	5	Institutional capacity
10.	Lack of standards and indicators to assess the quality of soils.	5	Institutional capacity
11.	Lack of expertise in organizing and promoting market agriculture.	3	Institutional capacity
12.	Poor quality products, lack of operation and maintenance.	3	Market failures
13.	Lack of interest from businesses for improving the quality of the soil.	4	Market failures
14.	The absence of market prices for the environmental benefits of soil improvement works	5	Market failures
15.	Lack of co-ordination among different interest groups.	5	Network failure
16.	Lack of involvement of stakeholders in decision making.	5	Network failure
17.	Lack of confidence in sustainable technologies.	4	Social, cultural and behavioral
18.	Inadequate information	5	Information and awareness
19.	Lack of awareness about issues related to climate change and technological solutions	3	Information and awareness

Republic of Moldova

20.	Unawareness of the relevant bodies of local administration and local population about the need to have an organic matter flow in soils to maintain quality and productivity capacity of the soils.	5	Information and awareness
21.	Unawareness by most agricultural businesses that only an optimal ratio of organic and chemical fertilizers in the soil can ensure high productivity of crops.	4	Information and awareness
22.	Lack of skilled local agricultural specialists.	4	Human skills

Table 1.3.2.3. The List of Key Barrier to technology transfer for Vetch field as green fertilizer into 5 year crop rotation technology.

Key barriers identified	Classification of the barriers
Scarcity of investment capital	Economic and financial
Lack of funding for vetch seed stock development	Economic and financial
Excessive fragmentation of land/ Small farm size	Economic and financial
Inadequate rural infrastructure and tenurial arrangements	Economic and financial
Insufficient legal and regulatory framework	Policy, legal and regulatory
Indifference of local public administration about the quality of communal soils.	Institutional capacity
Lack of standards and indicators to assess the quality of soils.	Institutional capacity
The absence of market prices for the environmental benefits of soil improvement works	Market failures
Lack of co-ordination among different interest groups.	Network failure
Lack of involvement of stakeholders in decision making.	Network failure
Inadequate information	Information and awareness
Unawareness of the relevant bodies of local administration and local population about the need to have an organic matter flow in soils to maintain quality and productivity capacity of the soils.	Information and awareness

1.3.3. Identified measures to overcome barriers to technology transfer for *Vetch field as green fertilizer into 5 year crop rotation technology*.

Similar to other technologies, **Logical Problem Analysis** was used as a tool to identify the measures to overcome the barriers.

The problems were reformulating into positive statements about future situations, arranging measures and results in an **Objective tree** as logically organized presentation of objectives. The Objective tree of this and other technologies are presented in the Annex I.

The measures were assessed according to their economic profile, incentives used and effects achieved. The results are presented in the tables below.

The Vetch field as a green fertilizer into 5 year crop rotation technology has been supported by the study of policy enabling environment. According to the investigations done by experts in the implementation of the technology falls under the jurisdiction of several laws, among which the most important are:

- Complex program of recovery of degraded lands and improving soil fertility ²¹;
- National Strategy for sustainable development of agroindustrial complex of Republic of Moldova ²²;
- The conservation and improvement of soil fertility ²³.

The working group considered that the highest impact with direct effect on technology implementation has the national policy on soil conservation “The conservation and improvement of soil fertility for 2011-2020 years”. The related regulatory acts complement the main law, contributing to a policy and regulatory path for technology transfer.

This technology scenario combined two purposes of vetch production: vetch plants as a crop for seed collection and as a green fertilizer as its main purpose. The experts have provided cost-effective analysis based on 5 year crop rotation, which can be run repeatedly until soil quality improved. **Financial-economic analysis** of technology implementation under a specified policy and regulatory acts for this technology along with a developed Policy Fact Sheet of this technology with compressed information about policy framework details are provided in the Annex III.

The results of undertaken work are provided in the tables No 1.3.3.1, 1.3.3.2 and 1.3.3.3 of this sub-chapter.

Table 1.3.3.1. The List of barriers and measures to overcome barriers to technology transfer of *Vetch field as green fertilizer into 5 year crop rotation technology*.

Barriers identified	Measures identified to overcome the barriers
Economic and financial	<ul style="list-style-type: none"> ○ Developing a system of economic incentives for agricultural enterprises that use green fertilizers. ○ The financial contribution of MAFI in reanimating the process of vetch seeds production on the basis of local varieties. ○ Consider incentives to attract investments in climate change technologies of Agriculture sector. ○ Create a fund for stimulating agricultural businesses to use green fertilizers, on the account of ecologic grants.
Market imperfection	Develop the logistics for the procurement by agricultural producers of equipment for climate technologies.

²¹ Complex program of recovery of degraded lands and improving soil fertility (2004), www.maia.gov.md

²² National Strategy for sustainable development of agroindustrial complex of Republic of Moldova (2008-2015), www.maia.gov.md

²³ The conservation and improvement of soil fertility for 2011-2020 years, www.maia.gov.md

Republic of Moldova

Policy, legal and regulatory	<ul style="list-style-type: none"> ○ Reduce taxation for forms which are promoting climate technologies. ○ Enforce promotion of climate technologies through subsidies for respecting good farming systems. ○ Increase accountability of farmers for long-term maintenance of soil quality ○ Provisions of soil management responsibilities in the Law on the Land Code and in the Law of the Republic of Moldova on Environmental Protection
Network failures	<ul style="list-style-type: none"> ○ Organize national and regional networking groups for farmers interested in promoting climate technologies. ○ Assure an efficient coordination between the main actors of green fertilizers chain
Institutional capacity	Cadastral Agency intensifies land consolidation process.
Information and awareness	<ul style="list-style-type: none"> ○ Creation of an extension service including on issues related to innovative climate technologies. ○ Public awareness about the implementation of environmentally friendly practices is an important objective in the process of disseminating and implementing the technology.
Social, cultural and behavioral	<ul style="list-style-type: none"> ○ The confidence in sustainable technologies should be restored by sound science, transparency and regulatory institutions.

Table 1.3.3.2. Categories of measures and incentives.

S. No	Financial measures	Non-financial measures	Complementary measures	Incentives
1	<p>Create a fund for stimulating agricultural businesses to use green fertilizers, on the account of ecologic grants.</p> <p>Responsible for implementation of activity should be the Ministry of Agriculture and Food Industry (MAFI) and largely the Ministry of Environment. These two ministries are provided with financial support (grants) for implementation of conservative agriculture.</p>	<p>Provision in the Land Code of the chapter on the possibility of long-term land lease and the lessor's responsibility for protection of the soil quality.</p> <p>For several years in Moldova are undertaken modifications to the Law "Land Code". In the improved version of the Land Code is necessary to include irreversible long-term lease of land and lessors responsibility for the deterioration of soil quality. Responsible - MAIA and Cadastral Agency.</p>	<p>Develop an agronomic advisory service within municipalities.</p> <p>Responsible for creating an agronomic advisory service for farmers are MAFI and the National Rural Development Agency -ACSA. ACSA consultants in villages should be agronomists. For cadastral engineers from municipalities the State Agrarian University of Moldova must organize courses in agronomy, thus, these public employees would have basic agronomic knowledge.</p>	<p>Develop a system of economic incentives at the state level for agricultural businesses which use green fertilizers.</p> <p>Responsible entity is the MAFI. The system of economic incentives in agriculture businesses using green manure can be organized by the granting of low-interest loans with funds to subsidize agriculture.</p>

Republic of Moldova

2	The financial contribution of MAFI in reanimating the process of vetch seeds production on the basis of local varieties.	Improving lease requirements in agriculture, raising agricultural land lessors' responsibility for maintaining soil quality in the farming process.	Organize permanent extension and training centers for the relevant specialists in this area besides research institutes and departments specialized in agricultural issues in universities and agricultural colleges, etc. Improve the national soil research system and create control service.	
3	The increase of funding from the State Budget and that of the grants to enhance the Agency for Land Relations and Cadastre land consolidation works.	Intensification by the Land Relationships and Cadastre Agency of land consolidation processes.	Building awareness of agricultural businesses about environment friendly agricultural practices by organizing thematic seminars during the cold season	Low interest loans and longer grace period

Table 1.3.3.3. The Final List of measures to overcome technology barriers for Vetch field as green fertilizer into 5 year crop rotation technology.

S. No.	Measures
1.	Developing a system of economic incentives for agricultural enterprises that use manure and green fertilizers.
2.	To reduce/avoid taxes for profit for farmers investing in good agricultural practices, including procurement of equipment.
3.	To release subsidies for farmers implementing climate technologies
4.	Increase accountability of farmers for long-term maintenance of soil quality
5.	Provisions of soil management responsibilities in the Law on the Land Code and in the Law of the Republic of Moldova on Environmental Protection.
6.	Cadastre Agency intensifies of land consolidation process
7.	Improve R&D system in soil science.
8.	Assure an efficient coordination between the main actors of organic and green fertilizers chain.
9.	Organize national and regional networking groups for farmers interested in promoting climate technologies.
10.	Promote programs for providing training and education on soil management.

1.4. Barrier analysis and possible enabling measures for *Applying 50 t/ha of manure with bedding to agricultural soils once per five years* technology.

1.4.1 General description of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years* technology.

This technology helps maintain a stable content of organic matter in the soil. The content of nutrients increases, and the soil structure improves. The arable layer becomes looser, more resistant to compaction, better provided with reserves of water accessible to plants. This increases crop resistance to drought.

The technology implies the return of the biophile elements contained in dung, urine and vegetal waste of cattle bedding, in the biological circuit. One ton of manure with bedding at 50-55% humidity contains about 15-18 kg of nitrogen, phosphorus and potassium.

Currently there are no large farms and cattle herd is concentrated in rural households. To use manure as fertilizer, municipalities have to organize the collection, storage, fermentation and storage of manure on special platforms. Technologies for processing and introduction of manure in the soil are provided with specially developed recommendations.²⁴

Realistically possible reserves of manure collection in the country do not exceed 2 - 3 million tons, which would be sufficient to fertilize only 200 thousand ha of agricultural lands annually, provided this amount is indeed collected (regretfully the amount collected is ten times smaller). The amount of manure possible to collect is 9 times lower than required.

This technology will ensure long-term preservation of soil fertility - the main means of production of the country, will protect agricultural land from desertification processes which lead to impoverishment of population and migration. It will improve the sanitary condition of rural environment.

Environmental benefits. This technology stops the accelerated degradation of soils, it reduces the risk of nitrate pollution of water in wells in villages, improves sanitary conditions in the villages and health of the population.

Social benefits. The social - economic effect of this technology implementation will be the following: it will increase the turnover and quality of agricultural production on arable soils, well-being of rural population, decrease migration, and increase the earnings for social infrastructure development.

1.4.2. Identification of barriers to technology transfer

The Adaptation working group has considered the technology market characteristics (high number of potential consumers, dealing with direct wants and needs of consumers, demand depends on consumer awareness, preferences, other) and classified *Applying 50 t/ha of manure with bedding to agricultural soils once per five years* as a *consumer good*.

The approaches and methods used in the identification and analysis of the barriers were similar to those described in *the Conservation system of soil tillage without herbicides for winter wheat* technology.

The results of the undertaken analysis are presented in the tables No 1.4.2.1, 1.4.2.2 and 1.4.2.3 in this sub-chapter.

²⁴*Organic Fertilizer User Guide. Ch Pontos, 2012.115p.*

Table 1.4.2.1. The Long List of Barriers to technology transfer of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years* technology.

S. No	Actors on the market	Large Categories of barriers	Barriers within the category	Detailed barrier description
1	Ministry of Agriculture, Ministry of Environment	Policy	Lack of the Law or Regulations on organic waste.	<ul style="list-style-type: none"> ○ At the republican and local level no responsible persons are assigned for collecting, preparation, storage and selling manure. ○ There is no mechanism to address the issue. ○ Funding sources are not identified.
		Economic and financial	High “up-front “investments. Lack of possibilities to finance capital expenditures for building communal platform utilities.	The need to finance: building of platforms and procurement of necessary equipment for the platforms.
			Lack of finance at low interest rates.	Interest on loans should not exceed 5% per year.
			Absence of financial incentives and punishments for promoting soil improvement technologies.	There are no incentives or tax exempts for farmers investing in good agricultural practices, including procurement of equipment.
		Regulatory	Excessive fragmentation of land as a result of land reform and the need for land consolidation	Too slow developments in the land consolidation process.
		Market failures	Undeveloped market	There is no system for manure collection, production and the manure market is not developed.
		Network failures	Lack of co-ordination among different interest groups	Lack of real coordination between research institutions in agriculture and soil areas and institutions design and implement soil improvement measures. Lack of coordination between Ministries.
			Weak connections between actors.	Extremely large number of enterprises in agriculture, dominance of subsistence rather than commercial agriculture.
Institutional and/organizational capacity	Insufficient institutional and organizational capacity of the government, professionals and businesses in agriculture.	<ul style="list-style-type: none"> ○ Organizational problems in collection and transport of waste from dispersed sources for centralized processing and value addition. ○ Lack of skilled professionals to organize and promote the use of manure. 		

Republic of Moldova

		Technical	Lack of standards and codes, poor quality products, lack of operation and maintenance.	Poor performance in standardization of agricultural products, poor quality control of agricultural products.
2	Municipalities	Regulatory	Lack of responsibility of the local public administration.	The Regulations for municipality activity do not include the manure management obligation.
			Lack of support from local administration for manure collecting activities.	The Regulations for municipality activity do not include the manure collection obligation.
			Lack of support from local administration for communal platform building.	This activity is not specified in the Regulations for municipality activity.
		Inadequate information	Poor knowledge of rural population about the role of soil in sustainable agriculture.	Lack of local extension centers
3	Agricultural businesses	Economic and financial	Large anticipated expense.	Lack of a favorable subsidy and loan policy (low interest loans and a grace period).
		Inadequate information	Limited knowledge about the importance of the organic: inorganic fertilizer ratio.	Lack of training and extension centers for agricultural businesses.

1.4.2.1. Economic and financial barriers

Economic and financial

High “up-front “investments. Lack of capital expenditure financing options for building inter-communal or collective platform of collection, preparation and storage of manure, and to purchase necessary equipment to these platforms for processing, transporting, spreading and soil incorporation of manure or partially fermented.

- Financial support needed for the implementation process at the expense of the Environmental Fund and special funds received as grants.
- High costs of activities related to production and applying manure to soil and lack of financial resources to purchase necessary equipment and apply manure to the soil.
Lack of finance at low interest rates. Interest on loans should not exceed 5% per year.
- Inadequate rural infrastructure and tenurial arrangements.
- Absence of financial incentives (rewards and punishments) for promoting soil improvement technologies.

1.4.2.2 Non financial barriers

Lack of Regulations on organic waste, primarily manure, as organic fertilizer, developed jointly with the Ministry of Environment. Financial support to the implementation process at the expense of the Ecological Fund and special funds received as grants.

Excessive fragmentation of land as a result of land reform and the need to consolidate land into agricultural enterprises with an optimal area that would allow implementation of crop rotation and the use of 50t/ha manure in a 5 field crop rotation.

Indifference of the local public administration about of quality of soils on communal lands and sanitary-epidemiological condition of villages.

Municipalities are not bound to manage the collection, storing and use of manure in villages. Non- involvement of municipalities in the process of building communal platforms required for collection and storage of manure in the yards of the farms that raise animals

Republic of Moldova

The passivity of municipalities in organization of communal platforms for manure collection; equipping such platforms with the necessary equipment; training the staff servicing platforms; organizing contractual relations between producers of manure and agricultural enterprises.

Market failure imperfection barriers

The local public administration is not involved in manure use issue on a contract and self-financing basis.

The commercial agriculture development process is too slow and, therefore, unable to form connections and foster strong relationships between businesses in agriculture, purchasers and traders of agricultural production and equipment.

Network failure imperfection barriers

Lack of real coordination between research institutions in agriculture and soil areas and institutions design and implement soil improvement measures.

Extremely large number of enterprises in agriculture, dominance of subsistence rather than commercial agriculture.

Lack of interinstitutional coordination.

Institutional and organizational capacity barriers

Organizational problems in collection and transport of waste from dispersed sources for centralized processing and value addition.

Lack of skilled professionals to organize and promote the use of manure.

Technical barriers

There is no national hierarchically organized single system for agricultural product standardization and quality control.

Information and awareness barriers

Unawareness of local administrative bodies and the population about the problem of manure from environmental, economic, social and sanitary perspective.

Ignorance by the respective local government and the local population of manure problem of ecological, economic, social and health points of view.

Table 1.4.2.2. List of barriers and hierarchy classification

S No	Barriers identified	Rank (1-5)	Classification of the barriers (economic, financial, human capacity, awareness, institutional regulatory etc.)
1	Lack of finance at low interest rates.	5	Economic and financial
2	Inadequate rural infrastructure and tenurial arrangements.	5	Economic and financial
3	Absence of financial and economic incentives (rewards and punishments) for promoting soil improvement technologies.	5	Economic and financial
4	Undeveloped Market with poor infrastructure	5	Market failures
5	Lack of Law and Regulation of using organic waste	5	Policy, legal and regulatory
6	Lack of responsibility of the local public administration.	4	Policy, legal and regulatory
7	Insufficient and ineffective law enforcement at the local level	5	Policy, legal and regulatory

Republic of Moldova

8	Lack of co-ordination among different interest groups	5	Market failures
9	Organizational problems in collection and transport of waste from dispersed sources for centralized processing and value addition.	5	Institutional capacity
10	Lack of support from local administration for communal platform building.	4	Institutional capacity
11	The absence of market prices for the environmental benefits of soil improvement works	5	Market failures
12	Insufficient institutional and organizational capacity of the government, professionals and businesses in agriculture.	3	Institutional capacity
13	Lack of standards and codes, poor quality products, lack of operation and maintenance.	4	Technical
14	Poor knowledge of rural population about the role of soil in sustainable agriculture.	3	Inadequate information
15	Limited knowledge about the importance of the organic: inorganic fertilizer ratio.	3	Inadequate information

Table 1.4.2.3. List of Key Barriers to technology transfer for Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.

Key barriers identified	Classification of the barriers
High up-front investment.	Economic and financial
Lack of finance at low interest rates.	Economic and financial
Inadequate rural infrastructure and tenurial arrangements.	Economic and financial
Undeveloped Market with poor infrastructure.	Market failures
The absence of market prices for the environmental benefits of soil improvement works.	Market failures
Lack of Law and Regulation of using organic waste.	Policy, legal and regulatory
Insufficient and ineffective law enforcement.	Policy, legal and regulatory
Organizational problems in collection and transport of waste from dispersed sources for centralized processing and value addition.	Institutional capacity
Lack of co-ordination among different interest groups.	Network failure
Not aware of technologies for soil improvement.	Information and awareness
Poor knowledge of rural population about the role of soil in sustainable agriculture.	Information and awareness

1.4.3 Identified measures to overcome barriers to technology transfer for Applying 50 t/ha of manure with bedding to agricultural soils once per five years.

Similar to other technologies, **Logical Problem Analysis** was used as a tool to identify the measures to overcome the barriers.

The problems were reformulating into positive statements about future situations, arranging measures and results in **an Objective tree** as logically organized presentation of objectives. The Objective tree of this and other technologies are presented in the Annex I.

The measures were assessed according to their economic profile, incentives used and effects achieved. The results are presented in the tables No 1.4.3.1, 1.4.3.2 and 1.4.3.3 of this sub-chapter.

The Applying 50 t/ha of manure with bedding to agricultural soils once per five years **technology** has been supported by the study of policy enabling environment. According to the investigations done by experts in the implementation of the technology falls under the jurisdiction of several laws, among which the most important are:

- Waste management, toxic substances, mineral fertilizers and pesticides²⁵.
- The conservation and improvement of soil fertility since 2011-2020²⁶.
- Guide to organic fertilizers.²⁷

Working groups have considered that the highest impact with direct effect on technology implementation has the law on Waste management, toxic substances, mineral fertilizers and pesticides. In: The Moldovan Law on Environmental Protection No. 1515-XII, Chapter VI. The related regulatory acts complement the main law, contributing to a policy and regulatory path for implementing the technology.

Financial-economic analysis of technology implementation under specified policy and regulatory acts for this technology has two versions: profit and non-profit. The analysis shows that in the first year operation business is unprofitable. However, in the next 4 years, such activity can be profitable and may raise the interest of agri-business investors. In economic terms profitability is not high, but it can be increased if the price changes and additional services are provided. This kind of business can be classified as a social activity, waste management practice in rural areas.

The second scenario was considered that technology deployment within a business. Thus, the selling price will be increased annually by 5% , and the amount of fixed assets depreciation will be calculated annual rate of 10% of the original amount of investments - 370 000 €. From calculations made, we conclude that since year 8-th, the business becomes profitable. In this case, because the amount of losses is not large (in year 2 to 25,300 €), the work can be supported by the fund subsidization of agriculture for the first 7 years.

Cost-benefits calculations along with developed **Policy Fact Sheet (PFS)** of this technology with compressed information about policy framework are provided in the Annex III.

²⁵ Waste management, toxic substances, mineral fertilizers and pesticides. In: The Moldovan Law on Environmental Protection No. 1515-XII, Chapter VI. www.mediu.gov.md

²⁶ The conservation and improvement of soil fertility for 2011-2020²⁶, approved by Government Decision no. 626 of 20.08.2011. www.maia.gov.md

²⁷ Guide to organic fertilizers. Approved by the Scientific and Technical Council of the Ministry of Agriculture and Food Industry of Moldova. 26.01.2011

Table 1.4.3.1. The List of barriers and measures to overcome barriers to technology transfer of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years* technology.

Barriers identified	Measures identified o overcome barriers
Economic and financial	<ul style="list-style-type: none"> ○ Provision in the Ecologic Fund of Republic of Moldova of funds for construction of collection and storage communal platforms of manure. ○ Purchasing the equipment, using funding coming as environmental grants. ○ Introduce fiscal and regulatory measures for reduction of wastes/manure and promotion of manure utilization ○ Consider incentives to attract investments in climate change technologies of Agriculture sector. ○ Developing a system of economic incentives for agricultural enterprises that use manure as fertilizer
Market imperfection	Making collection, processing, storage and incorporation of manure into the soil a self-financing and self-management process in individual farms, among communal platforms servicing staff, agricultural businesses.
Policy, legal and regulatory	<p>Development of a law or regulations that would stipulate the obligations and responsibilities of all actors involved in collection, preparation, storage, transportation and the incorporation of manure in soil.</p> <p>Making it binding under the law or regulations on the use of manure in rural areas for municipalities to organize and control the construction of communal platforms, to build up the staff servicing the platforms and to organize the contractual relations between manure producers and agricultural businesses.</p>
Network failures	Making it binding under the law or regulations on the use of manure in rural areas for municipalities to organize and control the construction of individual platforms.
Institutional capacity	<ul style="list-style-type: none"> ○ Assigning the responsibility by inserting certain provisions in the Law on the Land Code and in the Law of the Republic of Moldova on Environmental Protection ○ The Agency for Land Relations and Cadastre to intensify agricultural lands consolidation process.
Market failure	<ul style="list-style-type: none"> ○ Promote via regulatory framework the establishment of market price for environmental benefits from soil improvement works ○ Improve existing standards and codes for organic fertilizer, set standards for the final product. Develop organic fertilizer production logistics.
Information and awareness	<ul style="list-style-type: none"> ○ Making the agricultural businesses aware about the environmental friendly practices through workshops held during the cold season by extension centers. ○ Raising the awareness of the local public administration and population about the problem of manure from an environmental, economic, social and sanitary perspective by creating consultancy centers.

Republic of Moldova

Table 1.4.3.2. Categories of measures and incentives

S. No	Financial measures	Non-financial measures	Complementary measures	Incentives
1	Provision in the Environmental Fund of funds for construction of communal or inter-communal platform for the collection and storage of manure, as well as for purchasing the necessary equipment, using the donor funding coming as environmental grants.	Development of a law or regulations that would stipulate the obligations and responsibilities of all actors involved in collection, preparation, storage, transportation and the incorporation of manure in soil	Intensifying by the Cadastre Agency of land consolidation process	Provide subsidies and reduces taxes For economic agents who implement sustainable green technologies.
2	Making collection, processing, storage and incorporation of manure into the soil a self-financing and self-management process in individual farms, among communal platforms servicing staff, agricultural businesses. Developing a system of economic incentives for agricultural enterprises that use manure as fertilizer.	Assess the responsibility by inserting certain provisions in the Law on the Land Code and in the Law of the Republic of Moldova on Environmental Protection	Imposing municipalities by law or regulation on use of organic waste in rural areas to organize and control the construction of individual platforms.	The Government can foster the use of economic instruments (Tariffs, taxes, fees, etc.) to achieve environmental goals While generating budgetary revenues.
3		Making it binding under the law or regulations on the use of manure in rural areas for municipalities to organize and control the construction of communal platforms, to build up the staff servicing the platforms and to organize the contractual relations between manure producers and agricultural businesses.		Develop an institutional mechanism for technology transfer Through a co-ordinated program.
4		Local Public Administrations have to organize the process of collection, processing, storage and incorporation of manure into the soil on a self-management and self-financing basis at the level of individual farms, communal platform service staff, agricultural businesses.		

Table 1.4.3.3. The Final List of measures proposed to overcome technology transfer for *Applying 50 t/ha of manure with bedding to agricultural soils once per five years.*

S.No.	Measures
1	Develop appropriate law or regulation with the stipulation of assignments and responsibilities of all actors involved in the collection, preparation, storage, transportation and incorporation of manure into the soil.
2.	Promote tax incentives for farmers practicing sustainable production
3	Introduce fiscal and regulatory measures for reduction of wastes/manure and promotion of manure utilization.
4	Provision in the Ecologic Fund of funds for the construction of collective communal or inter-platform collection and storage of manure, and purchase of necessary equipment that use sources of donors coming ecological form of grants.
5.	Cadastre Agency intensifies of land consolidation process.
6	Accountability assessment by introducing some specific points in the Land Code Act and the Moldovan Law on Environmental Protection.
7.	Development of a law or regulations that would stipulate the obligations and responsibilities of all actors involved in collection, preparation, storage, transportation and the incorporation of manure in soil.
8.	Assigning the responsibility by inserting certain provisions in the Law on the Land Code and in the Law of the Republic Of Moldova on Environmental Protection
9.	Making it binding under the law or regulations on the use of manure in rural areas for municipalities to organize and control the construction of communal platforms, to build up the staff servicing the platforms and to organize the contractual relations between manure producers and agricultural businesses.
10.	Raising the awareness of the local public administration and population about the problem of manure from an environmental, economic, social and sanitary perspective by creating consultancy centers.

1.5. The linkages of the barriers identified

In order to understand the core problems in technology transfer, the working group has performed **Logical Problem Analysis (LPA)**. The LPA diagrams were elaborated by experts in consultation with stakeholders. The cause/effect relations were organized in **Problem tree**, having the main problem put as starter problem and causes and effects identified and analyzed. Using LPA the working group was able to bring together the key elements of problems, use logical analysis of interrelated elements, and identify linkages between problem elements. Thus, the problem trees were used for understanding the causal relations of barriers, their linkages.

Problem Tree of each technology is provided in the Annex III.

1.5.1. Economic and Financing

Low income population prevails in the rural area, where agriculture is a dominant means of livelihood. Therefore, common barrier for all three soil technologies is the scarcity of money. All three soil improvement technologies require “up-front” investment.

Republic of Moldova

In Moldova farmers are categorized as low income population and small business entrepreneurs. They are unable to purchase equipment needed for implementing the technologies because they do not have access to the private or government investment funds necessary to purchase the equipment. Currently in Moldova private banks are not willing to invest in environmental technologies mainly because they are concerned about the risk-adjusted financial return.

Unfortunately Government also is not investing nor has little implication in such type of financing that contributes to the undeveloped market.

Individual and institutional investors also have reserves in investing in environmental technologies particularly with long-term returns. There are no incentives that would stimulate capital investment in such technologies. Many investors are not convinced, that climate change technology is a good investment.

1.5.2. Institutional barriers

The working group has mentioned weak interaction between economic actors, which creates logistic and institutional barriers. Poor communication and non-sharing the information between market players may lead to market failure. The lack of participatory arrangements that fully engage all the involved actors is a significant barrier.

A significant institutional barrier was considered the multi institutional management of soil sustainable practices in Moldova. Cadastre Agency manages the land and regulates the legal relations of land, but practically is not responsible for the sustainable use of land and soil. While Ministry of Agriculture manages the land use, but lack of leverage legal, economic and control functions and cannot sufficiently influence the sustainable use of agricultural land, protect and improve the soil. Ministry of Environment is empowered to control of the ecological and soil pollution, but, for various reasons, is not able to cover the necessary control throughout the country.

Lack of real coordination between research institutions in agriculture and soil areas and institutions design and implement soil improvement measures.

1.5.3. Policy and regulations

On the whole, the policy and regulatory framework in Moldova is supportive to implementation of soil improvement technologies, while in reality they are not in force or has little effect.

The experts have mentioned that in the area of land resources management and protection of the soil cover, the key issue is a delineation of specific legislation and civic land. Lack of interrelation between land legislation and civic legislation is based on different principles of regulation: the civic - the principle of freedom of action to the property owner that belongs, including its deterioration, while land legislation does not provide for such freedoms to earth, considering land as real estate of a special type, which is private, but is also a resource for living, natural wealth of the nation. So landowner is obliged to protect this wealth, rational use and keep it from meeting the nutritional requirements of recent population and future generations. Unfortunately, although there are provisions in the land law in Moldova obligation to maintain long-term soil quality favorable condition is not respected by most businesses in agriculture.

1.5.4. Provision of Information and Education

It was mentioned, that farmers or even local government representatives cannot make good decisions about the employment of soil conservation or soil improvement technologies due to lack of appropriate information about these technologies, their beneficial impact on water relations, nutrient retention, cycling capacity, etc. Respective institutions and agencies do not transmit the information to users, thus create relationships between information and institutional barriers.

In Moldova the information about successful projects in soil improvement is not disseminated, there are not replications of successful ideas. Lack of information interrelates with little market transparency.

1.6. Enabling framework for overcoming the barriers in Agriculture sector

Integrating environmental concerns into agricultural practices to make them more sustainable, including application of technologies to protect soils

Enabling environment was analyzed as part of Market mapping technique.

Republic of Moldova

Proposed technologies for soil conservation and soil improvement aim to be implemented at the national level starting with pilot projects with following replication. For this reason the enabling environment analysis of each technology considers regulatory, financial, economic, other components. A particular attention was given to enabling policy environment for commitment to the environment- friendly agricultural practices both at the local as well as national governments.

Components and their constituents of enabling environment with commentary for each of it, service providers and provided services of each soil technology are analyzed in the tables No 1.6.1, 1.6.2, 1.6.3, 1.6.4, 1.6.5 and 1.6.6 of this sub-chapter. They have been considered into more aggregated and conceptual version of each technology Market Map provided in the Annex I.

Table 1.6.1. Enabling business environment of *Conservation system of soil tillage without herbicides for winter wheat technology.*

S No	Enabling environment	Comments
1	<ul style="list-style-type: none"> ○ Regulations: ○ Import taxes and tariff regime, ○ Local production should be cheaper than imported one business licenses and regulations. 	<p>By reducing the import taxes it is possible to promote better technologies.</p> <p>Stimulation of local production, it is economically advantageous</p>
2	<ul style="list-style-type: none"> ○ Elaborated standards: ○ Standards for production ○ Standards for trade ○ Standards quality control and enforcement 	<p>They assist in promoting high quality production they promote high quality requirements for producers and consumers</p>
3	<ul style="list-style-type: none"> ○ Finance policy: ○ Import taxes and tariff regime. By reducing the import taxes it is possible to promote better technologies. ○ Avoiding taxes for profit for farmers implementing good agricultural practices ○ Decreasing the interest rate credits released for farmers practicing good agricultural practices ○ Subsidy allocation for farmers who respect a good farming system 	<p>Farmers respecting good agricultural practices are providing services for the environment and society which are not evaluated at the moment.</p> <p>By exemption from taxes on profit, farmers can improve their services for the environment and society.</p> <p>By decreasing the interest rates for credits we can increase the availability of credits for more agricultural producers.</p>
4	<ul style="list-style-type: none"> ○ Legislative acts supporting good agricultural practices ○ Preserving natural resources and people's health ○ Business regulation in a sustainable manner ○ Legal requirements for contracts ○ Registration of land and property 	<p>The legislation of the state should promote and support sustainable farming systems, which are preserving natural resources and maintain a healthy society.</p>
5	<p>Producers and consumers associations for promoting the common interest of high quality production and consumption. Local production is cheaper than imported; stimulation of local production is economically advantageous.</p>	<p>Both producers and consumers should protect their rights to high quality production and consumption.</p>
6	<p>Preventing corruption on the different levels in society, which should be done through Governmental and NGO organizations.</p>	<p>Corruption is one of the main barriers in promoting a healthy economy, environmental friendly and socially acceptable.</p>

Table 1.6.2. Service providers and service provision for *Conservation system of soil tillage without herbicides for winter wheat* technology.

S. No	Service providers	Input/services provision
1	Banks, delivery of credits	Financial services. It makes sense to establish special loans for the procurement of equipment at low percent of interests.
2	Delivery of inputs; state and private companies.	Retailers for machinery, seeds, mineral fertilizers, pesticides etc.
3	Delivery of information, knowledge and skills; business advice from Extension service.	Government, non-government organization and mass media establish a general information campaign in order to inform all customers about prices, services and credit facility for promoting climate technologies. The information is delivered also by extension service regarding how the new technologies are working in local conditions.
4	Facilitation of linkages by governmental and nongovernmental organizations.	Lack of coordination between different companies, which are delivering inputs may increase costs and reduce market of beneficial technologies. Communication between companies can allow reducing costs of equipment and facilitating procurements of beneficial equipment.
5	State services for trials of varieties (hybrids), chemicals and agricultural machines.	In order to find the best varieties, chemicals and agricultural machines they are tested before importing. Some equipment can be unsuitable for local conditions and can compromise the idea of good climate technologies. They can also provide some training for technicians and technical specialists.
6	Engineering services (O and M)	The equipment imported has to be maintained at high working capacity. A service should be established for fixing the equipment. The whole network of stores should be available with spare parts and express services.
7	Research and development and capacity building which is done by research institutions and universities.	A research program at the regional and national levels should be established in order to work out the particularities of climate technologies for local conditions. Research organization should work in cooperation with state services for trials of varieties, chemicals and equipment.

Table 1.6.3. Enabling business environment of *Vetch field as green fertilizer into 5 year crop rotation* technology.

S. No	Enabling environment	Comments
1	Amendments to the Land Code are regarding responsibility of agricultural lessors for the soil quality.	Making the long term land lease rules and the monitoring of the quality of leased soils more specific.
2	Consolidation of agricultural lands into agricultural exploitations	Sustainable profitable agriculture is only

Republic of Moldova

	larger than 400ha managed by one operator.	possible in big farms.
3	Developing an indigenous seed pool for autumn and spring vetch.	Restoring the seed pool of this crop, which was destroyed during the land reform.
4	Setting up a financial incentive fund for farmers implementing technologies which ensure soil protection.	Stimulate implementation of environmentally friendly agricultural technologies.
5	Improving the land lease system by taking into account of the interests of owners, leasers, soil protection needs.	Development of the legal prerequisites for rational farming of lands leased by agricultural businesses
6	Organization and management by the Ministry of Agriculture and Food Industry, relevant bodies of the local public administration of the process of technology implementation.	Administration and organizational support in the process of technology implementation.
7	Improving the soils quality control and monitoring system.	It is necessary to improve the national soil research system and to create control service.
8	Support from the state in ensuring the equipment necessary to implement the technology.	Low interest loans and longer grace period.
9	Introducing diversified crop rotation where the share of weeding crops does not exceed 50 % .	To protect the soil from erosion and improve the degraded lands .

Table 1.6.4. Service providers and service provision of Vetch field as green fertilizer into 5 year crop rotation technology.

S. No.	Service providers	Services provided
1	Ministry of Agriculture and Food Industry (MAFI), local public administration	Organizes and coordinates the large scale implementation of the technology, contributes to the restoration of the indigenous seed pool of autumn and spring vetch.
2	MAFI and the subordinated research and education institutes	Develops informational marketing, organizes training of agricultural professionals.
3	Ministry of Finance (MF) and MAFI	Protect the local agricultural producer on the market, create favorable conditions to sell the agricultural products.
4	Ministry of Finance (MF) and MAFI	Create a condition to subsidize the farmers by enabling low interest loans and grace period.
5	MAFI, Associations of Agricultural Producers	Ensures quality of the products by monitoring the quality in specialized laboratories.
6	MAFI, MF, specialized private	Strengthen the regional and ministerial business consultancy centers for

Republic of Moldova

	enterprises	agricultural producers.
7	Companies /owners of specific machinery	Support in providing equipment.
8	MAFI, subordinated research and education institutes, local public administration.	Create awareness and training centers for agricultural professionals at the local and national level.

Table 1.6.5. Enabling business environment of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.*

S. No	Enabling environment	Comments
1	Development the Regulations on collection, processing, storage and application of manure in the soil as organic fertilizer, and stipulate the responsibilities of municipalities for the sanitary-epidemiological conditions in villages and for this technology implementation.	It is necessary to reanimate the practice of using organic fertilizers to improve the environment inside villages, preventing ground waters and stream pollution, long-term maintenance of the soil quality.
2	Building of individual and communal platforms for manure collection, preparation and storing.	To create the core of the manure production system
3	Intensifying the land consolidation process	Sustainable and profitable agriculture is possible in bigger farms
4	Implementation of soil protective crop rotation	To protect the quality of soils
5	Development of a financial incentive fund for the agricultural producers implementing soil protection technology.	To stimulate implementation of environmentally friendly agricultural technologies.
6	Organization and management by the Ministry of Agriculture of the Implementation of soil protective technologies through the legislative framework	To ensure long term maintenance of soil fertility
7	Improving the state system of control and monitoring the quality of soils.	Improving the national system of pedological and agrochemical research
8	Support from the state for the provision of equipment necessary to implement the soils protective technologies.	Low interest loans and longer grace period.

Table 1.6.6. Service providers and service provision of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.*

S. No	Service providers	Input/services provision
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Republic of Moldova

1	Ministry of Agriculture and Food Industry (MAFI) and Ministry of Environment (ME)	Development of the Regulations on use or organize in rural areas, organization and coordination of the nationwide implementation of the technology
2	Environmental Fund under the Ministry of Ecology or private investors	Create a special fund building communal platform and providing necessary equipment
3	Science department of the MAFI	Developing informational marketing
4	MAFI	Protection of local producers on the market
5	MAFI	Development of training and awareness centers for farmers
6	Agricultural producers, MAFI	Ensuring quality of agricultural products through monitoring
7	MAFI	Capacity building for business consulting centers for agricultural producers
8	Ministry of Finance, Commercial banks	Loans with low interest rates and longer grace period for farmers

Chapter 2. Human Health Sector

Similarly to Agriculture sector, the Adaptation working group of Human Health sector had a stepwise approach performing barriers identification, their categorization, and analysis of specific elements of barriers to the widespread of the proposed measure. After identification and analysis of barriers, they have been prioritized, hierarchically classified based on 1-5 scale ranking.

As in the case of Agriculture sector, the working group of Human Health sector has discussed the characteristics of each technology and used Logical Problem Analysis in both barriers analysis and identification of measures. Problem tree and Objective tree for each technology have been developed in a participatory manner with contribution of experts and stakeholders representatives. These diagrams of two considered measures of Human Health sector are presented in Annex I.

Market analysis for each measure included the same 3 components as in the Agriculture sector case: business enabling environment, market chain actors and services provision.

The group analyzed the enabling environment to the promotion and diffusion of proposed health care measure from many points of view: country specific circumstances, characteristics of temperature and drought effects, health care measure capacity, physical space, personnel availability and skills, regulatory requirements for implementation of measure, policies to support adaptation to rising temperatures, sectors available infrastructure, other factors.

The experts have provided cost-effective analysis of the political path shall ensure the successful implementation of the measures from economic and financial viewpoints. Developed Policy Fact Sheet (PFS) of the measures with compressed information about the policy framework along with Cost-effective analysis is presented in the Annex III.

2.1 Preliminary targets for technology transfer and diffusion

Preliminary targets for technology transfer and diffusion for *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of wave's measure.*

Among the barriers facing the transfer of the proposed technology a leading cant occupies the financial resources of the health care sector. However, this refers only to abilities and rehabilitation procedures, because costs for health care services are insured by the National Company for Health Insurance (NCHI), operating on the basis of the law on compulsory health care insurance, Nr. 1585 from 27. 02. 1998. Neither Ministry of Health, nor NCHI, have no financial

Republic of Moldova

resources to purchase the equipment and the tools necessary for carrying out medical emergency care in critical periods of heat wave. Non-governmental funds do not provide for such expenses. The realization of this project can become a reality with the support of external finance and private business contribution. *The first preliminary target of this technology is its financial support.*

The second is the necessity to *develop institutional capacities for assuring the urban localities with provisional posts of medical care and prompt rehabilitation during critical periods of heat* in public places. For the moment there have no such capacities. The provisional post should be developed under territorial Health Centers umbrella, which will manage them and will be responsible for their display, provision and sustainable activity.

The following target should be *the determination of the number and places of carry out provisional posts of medical care and prompt rehabilitation during critical periods of heat*. The proposed measure is foreseen to be implemented by installing 40 provisional posts in Moldova with a 4 month period of operation. By the preliminary estimation there will be needed 8 in Chisinau city, 4 in Beltsi city, the other 28 will be installed 1-2 per town in some of the rural districts. Nevertheless, the mentioned numbers have to be made concrete.

Very important is to *provide the provisional posts of medical care and prompt rehabilitation with trained medical staff, medicine and expandable materials*. The lack of skilled medical attendants reaches 40% of demand. It may be eliminated by temporarily implicating of medical university students after a short intensive their training.

Preliminary targets for technology transfer and diffusion of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems.

Providing drinking water to the rural population is a serious problem despite the fact, that the Republic of Moldova has underground reserves of drinking water of sufficient quantity and good quality. According to the data of the Agency for Geology and Mineral Resources of the Minister of the Environment, groundwater reserves, forecast and confirmed, may cover the need of rural population in the drinking water. The problem however lies in the deficiency of material resources for obtaining and distributing water in rural municipalities.

Financial resources accumulated in the local budget of the mayoralties are designed to ensure educational establishments, health care services and implementation of social projects (construction of roads, overhauls etc.). For other local projects there are not sufficient financial resources. Such activities can be carried out only by a combination of public interest, private sectors and beneficiaries, first of all, external donors. But private interests are very limited, since the private sector is underdeveloped.

Major projects, including the provision of drinking water to rural localities, are achieved by the national budget, concerned financial amounts being provided by the budget law. Some communities (the number of which is very restricted) apply to the Social Investment Fund of Moldova (MOLDOVA SIF II), which is supporting specific projects. Nevertheless, the amount of the last is very paltry.

In our country a rich experience was gained on attraction of foreign sources (for example, of the Swiss Development Agency, USAID, etc.), which in the form of projects have already witnessed, or assist now in some rural communities of the Republic of Moldova. The financial share of the beneficiaries amounted to 10% of the approximate project.

At the moment the projects funded by foreign donors are carried out in a number of rural localities, but they do not contribute to the essential reduction of the drinking water deficiency for rural municipalities. So, *the first preliminary target of these technologies is financial its support.*

The traditions and experience in rural area are practically absent. There is a limited institutional capacity and lack of interest in existing institutions. That is why the second target is *to develop local institutional capacities for assuring the rural population with drinking water of guaranteed quality.*

The lack of skilled personnel in rural area reaches 90% of demand. This situation may be eliminated by worker training in the secondary vocational education system which is underdeveloped. Providing with a skilled personal in this field should be carried out by the local mayors or by the relevant consortium supported by beneficiaries or investors. So, the target is *to train skilled workers in the field of potable water facilities.*

In rural area there is a lack of communication and information and public participation in water supply problems. The barrier may be easily surpassed. The removal of barrier requires information campaigns carried out by local government authorities, Public Health Centers, mass-media and NGOs. So, there is a need to *strengthen the*

Republic of Moldova

information on rural population and intensify its confidence in new water supply technologies and develop relevant traditions, habits, consumer preferences and social biases.

2.2. Barrier analysis and possible enabling measures for *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves.*

2.2.1 General description of health measure

In the recent decades deaths and morbid conditions caused by heat waves become more frequent and pronounced. They turned into a new problem in the region and in the country. Development of modalities to adapt to heat waves is becoming more and more vital, especially for vulnerable groups of population. Increased access to emergency medical care and provision of prompt simple and effective rehabilitation services contribute greatly to saving lives and adapting of population to extreme temperatures generated by climate change.

Prolonged exposure to high temperatures is an obvious risk to the population, especially for the urban population. Heat stress, which develops as a result of prolonged exposure of the body to high temperatures in the environment, is a pathophysiological state which affects health and may entail sudden death.²⁸ Certain inexpensive, timely and sufficient measures prove to be effective to reduce heat stress and its consequences. Also, these measures are essential in the process of adapting to climate change, first of all for population in urban areas.

It is as a short term measure, which is part of the national health policy. This measure is accomplished with inexpensive, but efficient methods employed during critical periods of heat waves. The experience of many European countries shows that the organization and operation of provisional health posts in public places during critical periods allow preventing many complications generated by heat stress. In the Republic of Moldova is proposed that temporary health posts to be supplemented by prompt rehabilitation procedures, which ensure the more efficient adaptation of the body to high temperatures.

Support to vulnerable groups of the population is one of the main priorities in social assistance, included in the National Development Strategy for 2008-2011, approved through the Law On approval of the National Development Strategy for 2008-2011, nr. 295 as of 21.12.2007.

Economic benefits. Support to vulnerable groups of population in critical periods of natural disasters is a very effective measure in terms of the national economy as it allows maintaining the human potential of the country.

Environmental benefits. In terms of environmental development it is an indisputable priority, as it creates a better environment for human population during critical periods of heat waves.

Social benefits. Social benefits are obvious due to health care measures, respectively, significant spending cuts for the rehabilitation of people affected.

2.2.2. Identification of barriers to technology transfer

The Adaptation working group from the Human Health sector has met in several meetings to discuss the barriers against the diffusion of proposed health care technologies/measures and propose measures to overcome them.

The *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves* as a solution to reduce peoples' vulnerability during heat waves. Despite emphasis being placed on the health problem caused by heat waves in Moldova, particularly during summer time, little effective measures have been adopted and not being fully utilized. After consideration of this measure characteristic, the working group has categorized it as

Therefore, the implementation of *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves* is seen as innovative, adaptation action to avoid heat stress and dehydration during periods of hot weather, particularly in urban areas. However, there are constraints and barriers to public health adaptation arising from uncertainties of future climate and socioeconomic conditions, as well as financial, technological, institutional, social and individual cognitive limits. These and other challenges were addressed during working group discussions. As

²⁸ *Environment and Health Risks: the influence and effects of social inequalities. Report of an expert group meeting. Bonn, Germany, 9-10 September 2009, 48 p.*

Republic of Moldova

mentioned above, the barrier analysis was done stepwise, similar to Agriculture sector; the main results are presented in the tables No 2.2.2.1, 2.2.2.2, 2.2.2.3 of this sub-chapter.

Other components of barrier analysis- Problem Tree, Objective Tree, Market Map analysis are provided in the Annex I and Annex III.

Table 2.2.2.1. Long List of Barriers to transfer and diffusion of *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves health care measure.*

Main market players	Broad categories of barriers	Barriers within category	Detailed barrier description
Local public authority administrations	Economic and financial	Lack of financial resources	Poor local budget
		Uncertain macro- economic environment	Uncertain economic growth
		Inadequate access to financial resources	Fewer medical personnel have the knowledge and are motivated to access funding for health care projects.
	Policy, legal and regulatory	Insufficient legal and regulatory framework and enforcement.	Insufficient willingness or ability to enforce laws and regulations
		Red tape (bureaucracy).	High grade of bureaucracy in local public authority administrations
	Human skills	Lack of skilled personnel for the operation of climate technologies	Lack of service and maintenance specialists
	Social, cultural and behavioral barriers	Traditions and habits	Resistance to change, due to cultural reasons
		Lack of confidence in new climate technologies	Unknown product, inadequate information, lack of local participation
Information and awareness	Inadequate information	Poor dissemination of information to technology users	
Emergency medical care units	Economic and financial	Inadequate access to financial resources for procurements	Limited possibilities of equipment and medicines
	Policy, legal and regulatory	Insufficient legal and regulatory framework and enforcement	Insufficient willingness or ability to enforce laws and regulations
	Information and awareness	Inadequate information	<ul style="list-style-type: none"> ○ Poor dissemination of information to technology users ○ Poor infrastructure for communication of small-scale project support
	Policy, legal and regulatory	Insufficient legal and regulatory framework	Inefficient methodological support

Republic of Moldova

Local Public Health Centers	Information and awareness	Inadequate information	<ul style="list-style-type: none"> ○ Lack in information dissemination to population and NGOs ○ Lack in mass-media activity
NGOs	Social, cultural and behavioral	Lack of confidence in new climate technologies	Inadequate information and lack of participation

2.2.2.1 Economic and financial barriers

Provisional points of medical emergency care will be served by the institutions subordinated territorial Health Centers. Costs for health care are assured by the National Company for Health Insurance (NCHI), operating on the basis of the law on compulsory health care insurance, Nr. 1585 from 27. 02. 1998. But neither Ministry, nor NCHI, both have no financial resources to purchase the equipment and the tools necessary for carrying out medical emergency care in critical periods of heat wave. Non-governmental funds do not provide for such expenses. The realization of this project can become a reality with the support of external finance.

The very slow economic development of national economy does not provide funding to purchase the equipment and the tools necessary for carrying out medical emergency care in critical periods of heat wave. Other sources (the receiving funds or private funds) in the country are missing or of insignificant. For the proper furnishing of the temporal primary health care in the critical periods of heat wave an external assistance is necessary.

The local budget can't cover the outlay for equipment procurement. Project implementation may be successful with the external financial assistance.

1.2.2.2 Non-financial barriers**Policy, legal and regulatory**

For the proper functioning of the provisional posts of primary health care in the critical periods of heat wave an approval by the Government is necessary. Also it is necessary the elaboration and implementation of the regulation on both the operation of these posts and the way of population informing about the possibilities of urgent medical care in public places during the critical heat wave.

The implementation of provisional posts of primary health care in the critical periods of heat waves will become possible after the preparation, approval and implementation by government regulation on both the operation of these structures and the way of informing the population about the possibilities of urgent medical care in public places during the critical heat wave. NGOs and mass-media will undertake measures to overcome cultural and behavioral barriers.

Public Health Centers will develop and submit to governmental approval regulations on functioning of primary health care time in critical periods of heat wave.

Human skills

The lack of skilled medical attendants reaches 40% of demand. It may be eliminated by temporarily implicating of medical university students after short intensive their training Motivation of medical personnel to be engaged in this activity is highly important.

Social, cultural and behavioral barriers

To remove this barrier, it is necessary to start an information campaign, promoted both by mass-media and medical structures responsible for responsible for population health promotion issues.

Information and awareness

To remove this barrier, it is necessary to start an information campaign, promoted both by mass-media and medical structures responsible for population health promotion issues. It is necessary to start an information campaign, promoted both by mass-media and medical personnel responsible for population health promotion issues. The barriers may be surpassed. NGOs and mass-media will undertake measures to eliminate cultural and behavioral barriers.

Table 2.2.2.2. List of barriers and hierarchy classification

Health care providers /market actors	Barriers identified	Rank	Classification of the barriers
Local public authority administrations	Lack of financial resources	5	Economic and financial
	Limited institutional capacity	5	Institutional and organizational capacity
	Policy intermittency uncertainty	5	Policy, legal and regulatory
	Inappropriate financial incentives	4	Economic and financial
	Uncertain macroeconomic environment	4	Economic and financial
	Inefficient legal and regulatory enforcement framework	4	Policy, legal and regulatory
	Weak connectivity between actors favoring the new technology	4	Network failure
	Lack of involvement of stakeholders in decision making	4	Network failure
	Lack of skilled personnel for the operation of climate technologies	4	Human skills
	Inadequate information	4	Information and awareness
	High risk perception of climate technologies	4	Information and awareness
	Financially not viable	3	Economic and financial
	Traditions and habits	3	Social, cultural and behavioral barriers
	Lack of confidence in new technologies	3	Social, cultural and behavioral barriers
Feedback mechanism lacking or inadequate	3	Information and awareness	
Emergency medical care units	Inadequate access to financial resources	5	Economic and financial
	Insufficient legal and regulatory framework and enforcement	4	Policy, legal and regulatory
	Limited institutional capacity	4	Institutional and organizational capacity
	Lack of skilled medical attendants	4	Institutional and organizational capacity
	Inadequate information	4	Information and awareness
	Consumer preferences and social biases	3	Social, cultural and behavioral barriers
	Traditions and habits	3	Social, cultural and behavioral barriers
	Lack of confidence in new technologies	3	Social, cultural and behavioral barriers
Local Public Health Centers	Insufficient legal and regulatory framework	4	Policy, legal and regulatory
	Inefficient enforcement	4	Policy, legal and regulatory
	Lack of skilled personnel in estimation of dangerous level of climate phenomenon of public health	4	Human skills
	Inadequate information	4	Information and awareness
	Traditions and habits	3	Social, cultural and behavioral barriers

Republic of Moldova

Authority of police	Inadequate information	4	Population information
Economic agents (enterprises with great number of workers)	Lack of accommodation of provisional posts of medical emergency care and their supply	5	Inadequate medical emergency care
NGOs	Lack of confidence in new climate technologies	4	Social, cultural and behavioral barriers

Table 2.2.2.3. List of key barriers to transfer and diffusion of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of waves health care measure.

Key barriers identified	Classification of the barriers
Lack of financial resources	Economic and financial
Limited institutional capacity	Institutional and organizational capacity
Policy intermittency uncertainty	Policy, legal and regulatory
Inadequate access to financial resources	Economic and financial
Insufficient legal and regulatory framework	Policy, legal and regulatory
Inefficient enforcement	Policy, legal and regulatory
Lack of accommodation of provisional posts of medical emergency care and their supply	Inadequate medical emergency care
Lack of confidence in new climate technologies	Social, cultural and behavioral barriers

2.2.3 Identified measures to overcome barriers.

Concurrently with analyzing the barriers, the Adaptation group has worked on solutions in relation to what needs to be done by health care services (also public administration) to effectively implement the proposed measure and reduce the risks relating to severe hot weather in urban areas of the Republic of Moldova. The core results of measure identification, their assessment and proposed incentives are presented in the tables No 2.2.3.1, 2.2.3.2, 2.2.3.3, 2.2.3.4 in this sub-chapter.

It was assumed, that this measure will be provided by a budgetary funded health care agency/organization or based on donations, charity organizations, voluntary approach of NGOs. Therefore, the services provided would be free of charge. However, it does not exclude the involvement of private business of private medical firms, who would like to invest in this measure and provide it for the price. For this reason this health care measure was considered and analyzed as a consumer good. However, at the starting phase of its implementation, it is seen as free of charge activity and economic- financial analysis is done for non-profit version.

The calculations took into account the installation of 40 provisional posts 8 in Chisinau city, 4 in Beltsi city, the other 28 will be installed 1-2 per town in some of the rural districts. The stations will be placed near agricultural markets. Period of operation of these stations will be 4 months (May, June, July, and August). This analysis has been done to determine the needed investments and expenditures. The benefit of this technology is the provision of immediate medical aid and saving lives.

As mentioned above, cost effectiveness analysis of this technology is directed to a non-profit activity. Quantification they cannot be determined in financial resources. It can be done and / or supported by local or central authorities to prevent blood circulatory system illness of population during heat waves of the year. Based on official statistics on people with circulatory poles, we forecast average number of visits per day to 15 patients. Operating time positions, according to calculations is 4 months (120 days). Number of visits planned for the entire period can reach 50-70 thousand for the period with high temperatures. It is this indicator shows the benefit of this technology.

Proposed measure was discussed and considered to ensure that municipality health care units have the capacity and capability to deliver proposed services.

The measures were analyzed in the same context as barriers.

Republic of Moldova

As this measure was considered consumer good, the **Logical Problem Analysis** was applied as a tool to identify the measures to overcome the barriers. The working group disused the measures in the context the barriers were addressed, grouping by the same criteria as barriers. The problems were reformulating into positive statements of future situations, arranging measures and results in an **Objective tree** as logically organized presentation of objectives. The Objective tree of this and other technologies are presented in the Annex I.

The measures were assessed according to their economic profile, incentives used and effects achieved. The results are presented in the tables below.

According to the investigations done by experts the implementation of considered a health care measure falls under the jurisdiction of several laws and supervision of several policies and, among which the most important are:

- Republic of Moldova National Health Policy, 2007-2021²⁹
- Republic of Moldova Law for health protection³⁰
- The Republic of Moldova Law on state public health supervision³¹
- The Strategy for Health System Development³² approved by Government Decision No.1471 from 24.12.2007.

The working group considered that the highest impact with direct effect on technology implementation has the National health policy (2007), Law No 10 from 03.02.2012 relating to state supervision of public health. The experts have provided cost-effective analysis of the political path the health care measure will follow. **Developed Policy Fact Sheet (PFS)** of this technology with compressed information about the policy framework along with **Cost-effective analysis** is presented in the Annex I.

Table 2.2.3.1. List of barriers and measures for Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat health care measure.

No.	Barriers identified	Measures identified to overcome the barriers
1.	Lack of financial resources for purchasing of equipment, apparatus and consumer materials necessary for the proper functioning of the posts of temporary emergency care and rehabilitation.	To make sensitive private business, international bodies and donors in order to be financially supported in purchasing of equipment, apparatus and consumer materials necessary for the proper functioning of the posts of temporary emergency care and rehabilitation.
2.	Inadequate access to financial resources	To motivate researchers, medical personnel to get knowledge in excess funding for health care projects.
3.	There is not exhaustive information about the number of the population who suffer from extreme phenomena of climate change and places where the events are happening.	In periods of heat waves to collect in all towns and cities the information about the number of the population who suffer from extreme phenomena of climate change, inclusively the needing in medical emergency care, and places where the events are happening.
4.	Insufficient legal and regulatory framework and enforcement.	To enforce/update the legal and regulatory framework in order to assure proper functioning of the posts of temporary

²⁹ Republic of Moldova National Health Policy, 2007-2021", approved by Government Decision No 886 from 06.08.2007

³⁰ Republic of Moldova Law of health protection No.411 from 28.03.1995 with subsequent brought up-to-date, Republic of Moldova Law regarding Public Health State Supervision, No.10 from 03.02.2009

³¹ The Republic of Moldova Law Nr.10 from 03.02.2009 concerning state public health supervision

³² The Strategy of Health System Development, approved by Government Decision No.1471 from 24.12.2007.

Republic of Moldova

		emergency care and rehabilitation
5.	Weak connectivity between actors favoring the new technology	To assure an efficient coordination between urban authorities, services and relevant medical institutions
6.	Limited institutional capacity	To carry on a temporary emergency care and rehabilitation posts under the tents or in pavilions
7.	Lack of service and maintenance specialists	To strengthen the training process of medical colleges or/and to imply medical residents.
8.	Lack of traditions and inadequate information on population	To assure a proper dissemination of information via mass-media
9.	Lack of skilled personnel for the estimation of danger level of climate phenomenon of public health	To assure scientific investigations and to accumulate scientific data and experience concerning the hazard and the unfavorable impact of extreme climate change phenomenon of local urban population.

Table 2.2.3.2 Categories of measures and incentives for *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat* health care measure.

Financial measures	Non-financial measures	Complementary measures	Incentives
To make sensitive private business, international bodies and donors in order to be financially supported in purchasing of equipment, apparatus and consumer materials necessary for the proper functioning of the posts of temporary emergency care and rehabilitation.	To strengthen legal and regulatory framework concerning provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.	To strengthen the legal and financial motivation concerning involvement of stakeholders in the decision making process.	To strengthen population information for intensifying the confidence in new technologies and developing the traditions, habits, consumer preferences and social biases.
	To develop national and local institutional capacities for assuring the urban population with provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.		To develop appropriate financial incentives or other form of motivation to involve researchers, medical personnel to get knowledge in accessing funding for health care projects related to climate resilience and adaptation.
	To enforce university and preuniversity		

Republic of Moldova

	training in the problems of assuring the urban population with provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.		
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Table 2.2.3.3. The list of measures, economic profile, incentives used and their effects for *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.*

Measures	Economic profile	Incentive	Effects	
			Paid by the government	Paid by utilities
To establish provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat	Moderate initial investment	<ul style="list-style-type: none"> ○ The existence of legal decisions that contribute to solving the problem; ○ Expenses for services will be covered by the National Medical Assuring Company; ○ Economic profit from deaths and disease prevention will be increased; ○ Contributions to economic growth will be essential. 	<ul style="list-style-type: none"> ○ Beneficial impact on public health; ○ Beneficial impact on local and national budgets. 	Beneficial impact on family budgets
To assure provisional posts of medical emergency care and prompt rehabilitation with expense materials and medicines	Moderate investment covered by the National Medical Assuring Company	The necessity to reduce the adverse impact on public health of critical periods of heat.	Beneficial impact on public health	Assuring emergency care and rehabilitation during critical periods of heat.
To facilitate emergency care and prompt rehabilitation services in agglomerate public places during critical periods of heat.	Moderate investment for initial equipment and for maintaining of provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat	The necessity to reduce the adverse impact on public health of critical periods of heat.	<ul style="list-style-type: none"> ○ Beneficial impact on public health; ○ Contributing to the rise of life expectancy at birth. 	Beneficial impact on public health.

Republic of Moldova

To train medical assistants in nursing services and prompt rehabilitation during critical periods of heat	Contribution to ensuring sustainable and professional functioning of Health Centers and Family Doctors Centers	<ul style="list-style-type: none"> ○ The existence of Government decisions that stimulate the training of medical assistants; ○ The National budget support of medical assistant training. 	<ul style="list-style-type: none"> ○ Creation of new jobs. ○ Prevention of individual medical emergencies. 	Prevention of individual health emergencies.
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Table 2.2.3.4. The Final List of measures for *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.*

S No	Measures to overcome barriers
1.	Ensure the assistance of private business, domestic and international donor support.
2.	Improve access to finance for climate change related health care measures.
3.	Strengthen legal and financial motivation for involvement of stakeholders in the decision making process.
4.	Enforce the legal and regulatory framework support in order to assure proper functioning of the posts of temporary emergency care and rehabilitation.
5.	Develop national and local institutional capacities for assuring the urban population with provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.
6.	Facilitate emergency care and prompt rehabilitation services in agglomerate public places during critical periods of heat.
7.	Building up of database on diseases caused by climate change.
8.	Assure an efficient coordination between urban authorities, services and relevant medical institutions.
9.	Provide training for medical assistants in nursing services and prompt rehabilitation during critical periods of heat.
10.	Enforce university and pre-university training in climate change related health care problems.
11.	Assure scientific investigations regarding hazards and extreme weather events health impact of local urban population.

2.3. Barrier analysis and possible enabling measures of *Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology.*

2.3.1 General description of technology

In recent decades both incidence and severity of morbid conditions, as well as deaths caused by extreme phenomena of climate change are becoming more pronounced in Central Europe, including Moldova³³. They turned into a new

³³ *Guidance on Water and Adaptation to Climate Change. Economic Commission for Europe, UN. 2009, 130 p.*

Republic of Moldova

problem in the region and the country. Among the worst cases are the heat waves, floods and other weather events that increasingly affect the quality of life and health of a growing number of people.

In the Republic of Moldova the situation becomes alarming because of exhaustion of ground water reserves, as there are more than 150 thousand sources. Intense evaporation from the surface of the soil in summer, especially during heat waves, depletes these reserves. An effective way to adapt to climate change extreme phenomena could be building water supply systems in many rural areas.

This measure is part of the global climate change adaptation, reduction of risks caused by deficiency of safe and good quality drinking water in rural areas of Moldova. In the recent years this measure is being implemented by building of water supply systems, supported by external donors. However, the population of more than 500 rural communities will still suffer from lack of access to safe drinking water.

Benefits:

Environmental benefits. Reducing the volume of water extracted from groundwater will contribute to conservation biodiversity

Social benefits. Social benefits are obvious due to significant reduction of cost for the treatment of acute diarrheal diseases, viral hepatitis and chronic non-communicable diseases. Ensuring access of the rural population to safe quality water sources will substantially contribute to improving the quality of rural life

2.3.2 Identification of barriers to technology transfer.

According to market characteristics, the technology *Supply rural population with drinking water of guaranteed quality* was categorized as *a consumer good*, with intention to mass market it, having potential consumers such as private enterprises, research institutions, farmers associations, others.

The identification of barriers was done in a stepwise manner, similar to previous technologies. The results of this exercise are provided in the table No 2.3.2.1, 2.3.2.2, 2.3.2.3 of this sub-chapter.

In the barriers analysis working group used **Logical Problem Analysis (LPA)** for analyzing causal relations and core problems in technology transfer. The participants have arranged the problems into a hierarchy of causes and effects having a central starting problem a generic problem for technology transfer. **The LAP Problem Tree** emphasized the main links between causes and effects and organized them into logical interrelations, addressed the basic issues and highlighted linkages with external factors. On the Problem Tree diagram the causes are shown below the starter problem and effects above. The LPA Problem Tree is included in the Annex I.

Table 2.3.2.1. Long List of Barriers to transfer of *Rural population supply with potable water of guaranteed quality. Building of local water supply systems health care measure.*

Main Actors	Broad categories of barriers	Barriers within categories	Detailed barrier description
Local public authority administrations	Economic and financial	a.Inadequate access to financial resources	Lack of access to credit due to the impossibility to pay off the credit
		b.Red tape (bureaucracy)	High grade of bureaucracy in local public authority administrations
		c.Uncertain macro-economic environment	Balance of payment problems and uncertain economic growth
		d.Lack of entrepreneurial skills to reach the findings	Fewer medical personnel have entrepreneurial knowledge to reach grant

Republic of Moldova

			competitive funding sources
	Network failures	Lack of involvement of stakeholders in decision making	Stakeholder consultation culture missing
	Institutional and organizational capacity	Limited institutional capacity	Lack of interest in existing institutions
	Human skills	Lack of skilled personnel in building of local water supply systems and their maintenance.	Lack of service and maintenance specialists
	Social, cultural and behavioral barriers	Traditions and habits	Resistance to change, due to habit and cultural reasons
	Information and awareness	Inadequate information	Poor dissemination of information to technology users
Enterprises interested in development and building of local water supply systems	Economic and financial	Inadequate access to financial resources	Lack of access to credit
	Institutional and organizational capacity	Limited institutional capacity	Lack of interest or capacity in existing institutions
	Human skills	Lack of skilled personnel for the installation of water supply technologies.	<ul style="list-style-type: none"> o Lack of entrepreneurs in territories. o Lack of service and maintenance specialists.
	Social, cultural and behavioral barriers	a. Consumer preferences and social biases	High discount rates on consumers
		b. Traditions and habits	Resistance to change, due to cultural reasons .
		c. Lack of confidence in new technologies.	Unknown product, inadequate information, lack of local participation.
	Information and awareness	a. Inadequate information	<ul style="list-style-type: none"> o Poor dissemination of information to technology users. o Poor infrastructure for communication of small-scale project support.
Local Public Health Centers	Social, cultural and behavioral	Traditions and habits	Rural peoples' resistance to new technologies
	Information and awareness	Inadequate information	Lack in information dissemination to population and NGO
NGOs	Social, cultural and behavioral	Lack of confidence in new technologies	Inadequate information and lack of participation

Republic of Moldova

2.3.2.1. Economic and financial barriers

At the moment the projects funded by foreign donors are carried out in several rural localities, but they do not contribute to the essential reduction of the drinking water deficiency for rural municipalities. Providing drinking water to the population is a serious problem for rural municipalities. Financial resources accumulated in the local budget of the of mayoralties are designed to ensure educational establishments, health care services and implementation of social projects (construction of roads, overhauls etc.).

For other local projects there are not sufficient financial resources. Such activities can be carried out only by a combination of public interest, private sectors and beneficiaries (foreign donors). But private interests are very limited, since the private sector is underdeveloped.

Major projects, including the provision of drinking water to rural localities, are achieved by the national budget, concerned financial amounts being provided by the budget law. Some communities (the number of which is restricted) apply to the Social Investment Fund of Moldova (MOLDOVA SIF II), which is supporting specific projects, but the amount of the last is very paltry.

In our country a rich experience was gained on attraction of foreign sources (for example, of the Swiss Development Agency, USAID, etc.), which in the form of projects have already witnessed, or assist now in some rural communities of the Republic of Moldova. The financial share of the beneficiaries amounted to 10% of the approximate project. National and local authorities should take measures to overcome bureaucratic barriers still present in the actions of local public administration authorities.

Local budgets are based on collections from agriculture, which develops choppy. Local budget may cover no more than 10% of the resources needed for water provision of the rural localities. It is necessary to draw the financial resources from external donations and/or from the private sector, although the private sector is underdeveloped in rural area. Financing should be carried out over a long period. In such cases, according to the international experience, it has to combine the private interest with the interest of local public authorities. Financial resources should be attracting not only in the form of credit, but the investments and contributions of beneficiaries and holders as well.

Republic of Moldova has gained a rich experience for the involvement of the Swiss Agency for Development, USAID, etc.), which in the form of projects have already witnessed in the country to reassure rural villages.

The lack of skilled personnel in rural area reaches 90% of demand. This barrier may be eliminated by worker training in the of the secondary vocational education system completely or partially, with good quality drinking water from centralized sources.

2.3.2.2 Non financial barriers

Network failures

There is a need to create an enterprise specialized in the respective field in rural areas that will ensure the maintenance of aqueducts in functional status during the period of operation. There is an absence of traditions and experience in rural area. These barriers may be surpassed by involving the stakeholders in the decision making process.

Institutional and organizational capacity

The traditions and experience in rural area are absent. These barriers may be surpassed by creating and strengthening institutional capacities in rural area. The barriers may be surpassed. To remove the barrier is necessary to create institutional structures which would ensure the operational maintenance of aqueducts.

Human skills

The lack of skilled personnel in rural area reaches 90% of demand. This barrier may be eliminated by worker training in the of secondary vocational education system.

Providing with specialists in the field should be carried out by the local mayor independent or by the consortium with the beneficiaries, either by investors.

Social, cultural and behavioral barriers

Republic of Moldova

The removal of barrier requires information campaigns carried out by local government authorities, mass-media and NGOs. The barriers may be easily surpassed. The removal of barrier requires information campaigns carried out by local government authorities, mass-media and NGOs.

The barriers may be easily surpassed. To remove the barrier is necessary to start a health promotion activity campaign, provided by Public Health Centers, local government authorities, and the mass-media.

Information and awareness

The removal of barrier requires information campaigns carried out by local government authorities, mass-media and NGOs. The barriers may be easily surpassed. The removal of barrier requires information campaigns carried out by local government authorities, NGOs and mass-media. The barriers may be easily surpassed. To remove the barrier is necessary to start a health promotion activity campaign, provided by Public Health Centers, local government authorities, and the mass-media.

Table 2.3.2.2. List of barriers and hierarchy classification

Man market actors	Barriers identified	Rank	Classification of the barriers
Local public authority administrations	Inadequate access to financial resources	5	Economic and financial
	Lack of decision concerning designing of the centralized water supply system	5	Policy, legal and regulatory
	Insufficient legal and regulatory framework and enforcement	4	Policy, legal and regulatory
	Policy intermittency and uncertainty	4	Policy, legal and regulatory
	Red tape (bureaucracy)	3	Policy, legal and regulatory
	Lack of involvement of stakeholders in decision making	5	Network failures
	Limited institutional capacity	4	Institutional and organizational capacity
	Lack of skilled personnel in supplying the rural population with drinking water or guaranteed quality and in the building of local water supply systems	4	Human skills
	Traditions and habits	3	Social, cultural and behavioral barriers
Inadequate information	4	Information and awareness	
Enterprises interested in development and building of local water supply systems	Inadequate access to financial resources	5	Economic and financial
	High cost of capital	5	Economic and financial
	Inappropriate financial incentives and disincentives	4	Economic and financial
	Inefficient enforcement	4	Economic and financial
	Red tape (bureaucracy)	5	Economic and financial
	Limited institutional capacity	4	Institutional and organizational capacity
	Lack of skilled personnel for the installation of water supply technologies	3	Human skills

Republic of Moldova

	Consumer preferences and social biases	4	Social, cultural and behavioral barriers
	Traditions and habits	3	Social, cultural and behavioral barriers
	Lack of confidence in new technologies	3	Social, cultural and behavioral barriers
	Inadequate information	4	Social, cultural and behavioral barriers
Local Public Health Centers	Insufficient legal and regulatory framework in estimation of drinking water scarcity impact on population health	4	Policy, legal and regulatory
	Inefficient enforcement	4	Policy, legal and regulatory
	Lack of skilled personnel in estimation of drinking water scarcity impact on population health	4	Human skills
	Traditions and habits	3	Social, cultural and behavioral barriers
	Inadequate information	4	Information and awareness
NGOs	Lack of confidence in new technologies	3	Social, cultural and behavioral barriers

Table 2.3.2.3. List of Key Barriers to technology transfer *Rural population supply with potable water of guaranteed quality. Building of local water supply system health care measure.*

Barriers identified	Classification of the barriers
Inadequate access to financial resources	Economic and financial
Uncertain macroeconomic environment	Economic and financial
Red tape (bureaucracy)	
Lack of decision concerning designing of the centralized water supply system	Policy, legal and regulatory
Lack of involvement of stakeholders in decision making	Network failures
Inadequate access to financial resources	Economic and financial
High cost of capital	Economic and financial
Insufficient legal and regulatory framework in estimation of drinking water scarcity impact on population health	Policy, legal and regulatory
Inefficient enforcement	Policy, legal and regulatory
Lack of skilled personnel in estimation of drinking water scarcity impact on population health	Human skills
Lack of confidence in new technologies	Social, cultural and behavioral barriers

Republic of Moldova

2.3.3 Identified measures

The adaptation health care measure Supply rural population with drinking water of guaranteed quality. Building of the local water supply system was considered as consumer good and the working group has performed **Logical Problem Analysis** to identify the measures to overcome the barriers. The experts have prepared sector specific information, policy documents, and other useful information for discussions during the meetings with stakeholders. The working group disused the measures in the context the barriers were addressed, grouping by the same criteria as barriers. The problems were reformulating into positive statements of future situations, arranging measures and results into **an Objective tree** as logically organized presentation of objectives. The Objective tree of this and other technologies are presented in the Annex I.

The measures were assessed according to their economic profile, incentives used and effects achieved. The results are presented in the tables No 2.3.3.1, 2.3.3.2, 2.3.3.3 and 2.3.3.4 of this sub-chapter.

The Supply rural population with drinking water of guaranteed quality. Building of local water supply system technology has been supported by the study of policy enabling environment. According to the investigations done by experts in the implementation of the technology falls under the jurisdiction of several laws, among which the most important are:

- Republic of Moldova National Health Policy, 2007-2021³⁴,
- Civil Protection and Emergency Situations³⁵;
- Republic of Moldova National Health Policy, 2007-2021³⁶.

Working groups have considered that the highest impact with direct effect on technology implementation has the Republic of Moldova Law concerning drinking water

The experts have provided cost-effective analysis of the political path shall ensure the successful implementation of the technology and obtaining the best value of money. This technology is classified as a commercial and become attractive for investors in the field. In these calculations were determined depending on current prices income from marketing services. Over the next years prices change depending on inflation. Also, over 10 years of fixed assets can be recovered from the expected revenue account. As shown in the calculations are reviewed every 3 years of service price and operating costs. Forecasting period can be updated depending on the delivery price, cost and price useful.

Cost-effective analysis along with developed **Policy Fact Sheet (PFS)** of this technology with compressed information about policy framework are included in the Annex I.

Developed Policy Fact Sheet (PFS) of this technology with compressed information about the policy framework along with **Cost-effective analysis** is presented in the Annex I.

Table 2.3.3.1. The List of barriers and measures for Rural population supply with potable water of guaranteed quality. Building of local water supply systems health care measure/technology.

Barriers identified	Measures identified to overcome the barriers
Lack of financial resources, inadequate access to financial resources or financially not viable	<ul style="list-style-type: none"> ○ Elaboration of an incentive mechanism for private resources attraction in sustainable development technologies ○ Stimulation of investment attraction of commercial bank funds in rural localities water supply problems ○ Application of international donors in the implementation of the measures
Inappropriate financial incentives	<ul style="list-style-type: none"> ○ Review government policy in investment activity, including activities of the banks in order to make it more attractive to invest means in adaptation to extreme phenomena of

³⁴ Republic of Moldova National Health Policy, 2007-2021³⁴, approved by Government Decision No 886 from 06.08.2007

³⁵ Civil Protection and Emergency Situations (Law Nr.93 from 05.04.2007).

³⁶ Republic of Moldova National Health Policy, 2007-2021

Republic of Moldova

	climate change
Lack of arguments concerning decision in designing of centralized water supply systems	<ul style="list-style-type: none"> ○ Conducting a national study on the estimation of reserves of underground water from sources both in terms of volume and quality for the subsequent argumentation of the rural localities drinking water supply policy.
Insufficient legal and regulatory framework and enforcement	<ul style="list-style-type: none"> ○ Updating the existing legal framework in order to strengthen it and develop the new regulations in this area
Uncertain macroeconomic environment	<ul style="list-style-type: none"> ○ To create a favorable climate for macroeconomic long-term sustainability investment in economic and social development
Lack of involvement of stakeholders in decision making in designing and building of centralized water supply systems	<ul style="list-style-type: none"> ○ To develop and implement measures for increasing of decision-makers interest in designing and building of centralized water supply systems
Limited institutional capacity	<ul style="list-style-type: none"> ○ Institutional framework developed in the branch centralized provision of rural population with drinking water sources of guaranteed quality
Weak connectivity between actors favoring the new technology	<ul style="list-style-type: none"> ○ To elaborate a mechanism that would effectively eliminate the obstacles between the structures that develop and implement new water supply technologies
Lack of skilled personnel in water supply of rural communities	<ul style="list-style-type: none"> ○ Strengthening the training process of colleges and Universities in technologies of drinking water supply of rural localities
Inadequate information	<ul style="list-style-type: none"> ○ To intensify the measures for informing the population in rural localities in problems of supplying with drinking water of guaranteed quality ○ To involve NGO, mass-media and other organizations in rural localities in problems of supplying with drinking water of guaranteed quality
Traditions and habits	<ul style="list-style-type: none"> ○ To develop and spread the new traditions and customs in rural municipalities in the problems with the supply of safe drinking water, focusing on the work of counselors, NGOs, etc.
Feedback mechanism lacking or inadequate	<ul style="list-style-type: none"> ○ To develop and implement appropriate and effective feedback mechanisms of measures implemented and the rural population welfare
Monitoring of the effectiveness of undertaking measures	<ul style="list-style-type: none"> ○ To develop and implement appropriate and efficient mechanisms in order to monitor the social effectiveness of developed and implemented measures

Table 2.3.3.2. Categories of measures and incentives for Rural population supply with potable water of guaranteed quality. Building of local water supply systems technology diffusion.

Financial measures	Non-financial measures	Complementary measures	Incentives
To search out the financial resources for local water	To strengthen legal and regulatory framework	To strengthen the legal and financial	To strengthen population information for intensifying the

Republic of Moldova

supply systems building.	concerning local water supply systems building.	motivation concerning involvement of stakeholders in the decision making process.	confidence in new technologies and developing the traditions, habits, consumer preferences and social biases.
To develop appropriate financial incentives in the problems of assuring the rural population with drinking water of guaranteed quality.	To develop national and local institutional capacities for assuring the rural population with drinking water of guaranteed quality.		
	To enforce university and preuniversity training in the problems of assuring the rural population with drinking water of guaranteed quality.		
	To provide scientific investigations in the estimation of drinking water scarcity impact on population health and in developing relevant regulatory framework.		

Table 2.3.3.3. List of measures, their economic profile, incentives and the effect of proposed measures for Rural population supply with potable water of guaranteed quality. Building of local water supply systems technology.

S. No	Measures	Economic profile	Incentive	Effect	
				Paid by the government	Paid by utilities
1.	To search out the financial resources for local water supply systems building	High initial investment	Allow privatization of various water utility responsibilities and assets.	Beneficial impact on the local and national budgets	Contribution to the development enterprises; Ensuring a positive trade balance; The creation of new jobs.
2.	To develop appropriate financial incentives in the problems of assuring the rural population with drinking water of guaranteed quality	Minimal investment or not any need in investment	Feed in tariffs of water supplying	Beneficial impact on local and national economic climate	Beneficial impact on the enterprises and business development
3.	To strengthen legal and regulatory framework concerning local water supply	Minimal investment or not any need in	Ministry of Health and Ministry of	Beneficial effect on public health	Beneficial impact on supply rural population with

Republic of Moldova

	systems building	investment	Environment to put efforts in oversight and enforcement of regulations for public water systems. The framework for regulating the nation's drinking water to extend across local and national levels.	and life quality.	drinking water of guaranteed quality
4.	To develop national and local institutional capacities for assuring the rural population with drinking water of guaranteed quality	Moderate initial investment	Public support to sound policy decisions.	Beneficial effects on public health and life quality.	Beneficial impact on supply rural population with drinking water of guaranteed quality
5.	To enforce university and preuniversity training in the problems of assuring the rural population with drinking water of guaranteed quality	Moderate investment	Incorporate studies in the field of water science into BCs /MS level health and technological curricula	Beneficial effects on the centralized water supply good function.	Beneficial impact on the enterprises and business development.
6.	To develop scientific research on water-related health issues of rural population, to focus on technological methods, models, applications of assuring high quality water in rural communities.	Moderate investment	Set national water related health problem as national scientific priorities. Develop a grant program for scientific research in water resources conservation, water recycling, water quality technological areas.	Beneficial effects on public health and life quality	Beneficial impact on supply rural population with drinking water of guaranteed quality
7.	To strengthen the legal and financial motivation concerning involvement of stakeholders in the decision making process	There is no need in investment	Allow privatization of various water utility responsibilities and assets.	Beneficial impact on the local and national budgets.	Beneficial impact on the enterprises and business development.
8.	To strengthen population information for intensifying the confidence in new technologies	Moderate investment	To strengthen population information for	Beneficial effects on public health	Beneficial impact on supply rural population with

Republic of Moldova

	and developing the traditions, habits, consumer preferences and social biases.		intensifying the confidence in new technologies and developing the traditions, habits, consumer preferences and social biases.	and quality life	drinking water of guaranteed quality
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Table 2.3.3.4. The Final List of measures for Rural population supply with potable water of guaranteed quality. Building of local water supply systems technology.

S No	Measures to overcome barriers
12.	Elaboration of an incentive mechanism for private resources attraction in sustainable development technologies.
13.	Stimulation of investment attraction of commercial bank funds in rural localities water supply problems.
14.	Review government policy in investment activity, including activities of the banks in order to make it more attractive to invest means in adaptation to extreme phenomena of climate change
15.	Institutional framework development in the area of centralized provision of rural population with drinking water sources of guaranteed quality
16.	To develop and implement measures for increasing of decision-makers interest in designing and building of centralized water supply systems.
17.	To elaborate a mechanism that would effectively eliminate the obstacles between the structures that develops and implements new water supply technologies.
18.	Conducting a national study on the estimation of reserves of underground water from sources both in terms of volume and quality for the subsequent argumentation of the rural localities drinking water supply policy.
19.	Updating the existing legal framework in order to strengthen it and develop the new regulations in this area.
20.	To intensify the measures for informing the population in rural localities in problems of supplying with drinking water of guaranteed quality.
21.	To involve NGO, mass-media and other organizations in rural localities in problems of supplying with drinking water of guaranteed quality.
22.	Strengthening the training process of colleges and Universities in technologies of drinking water supply of rural localities.

2. 4. The linkages of the barriers identified

The Human Health sector of the Republic of Moldova is comprised by many organizations and institutions aimed to improving population health. However, it does not ensure an effective and coordinate response to newly proposed health care measures mainly due retard reaction with little effect.

Applying LPA, building Problem three, the working group has identified interinstitutional barriers that lower the technology transfer.

The lack of legal support for the allocation of financial resources for health centers to ensure benefits for affected environments. Thus, health is a central financial supporter to purchase water for the affected subject, chilling her air conditioning provisional points of medical assistance and rehabilitation during heat waves.

Republic of Moldova

One of the key barrier is the lack of intersectoral collaboration between central and local public administration authorities in the matter of supply of good quality drinking water to rural areas. This important problem is almost entirely left to local authorities.

Another barrier is the lack of regulations at the state and local level in the volume of complex emergency assistance (primary health care and social assistance) in cases of emergencies, including heat period.

Another barrier is the lack of implementation and monitoring stages of material support of the National Water Supply and Sewage Moldova Republic till 2015, approved by Government Decision of 30.12.2005 Nr.1406

Other common barriers are:

- Lack of financial resources
- Insufficient legal and regulatory framework
- Limited institutional capacities
- Policy intermittency uncertainty
- Inefficient enforcement
- Lack of confidence in new climate technologies
- High grade of bureaucracy in local public authority administration

2.5. Enabling framework for overcoming the barriers

The enabling environment of technology transfer of healthcare technologies has been analyzed in the context of institutional, administrative, legislative and policy frameworks, level of existing R&D. The results of undertaken analysis are presented in the tables No 2.5.1, 2.5.2, 2.5.3 and 2.5.4 in this sub-chapter.

In the case of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves measure, the operation does not bring profit therefore much reliance is made on external factors, as international donors, charity organizations, and voluntary approaches.

Both for Agriculture and Human Health sectors the enabling environment consists not only of domestic factors, but also international factors. During the analysis of existing environment to enable the diffusion of each technology, the participants have indicated the gaps and improvements needed.

Both health care measures rely on the Government contribution to enabling environment, through development of appropriate policies and regulations.

Table 2.5.1. Enabling Environment of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves health care measure/technology.

No.	Enabling environment	Comments
1.	Increased sensitiveness of the international bodies and donors in order to be financially supported in purchasing of equipment, apparatus and consumer materials necessary for the proper functioning of the posts of temporary emergency care and rehabilitation	National and local budgets can't cover all charges for medical emergencies. That is why external financial support will be a great help in purchasing of equipment, apparatus and consumer materials necessary for the proper functioning of the posts of temporary emergency care and rehabilitation
2.	Increased awareness during the periods of heat waves via collection in all towns and cities the information about the number of the population who suffer from extreme phenomena of climate change, inclusively the needing in medical emergency care, and places where the events are happening	The routine collecting of information provides data about the whole number of affected people but do not assure realistic data about the causal factors of impact on health

Republic of Moldova

3.	To enforce/update the legal and regulatory framework in order to assure proper functioning of the posts of temporary emergency care and rehabilitation	There are not regulatory and methodological framework in assuring the proper functioning of the posts of temporary emergency care and rehabilitation yet
4.	To assure an efficient coordination between urban authorities, services and relevant medical institutions	There is a necessity of establishing a local body which will coordinate the activities between urban authorities, services and relevant medical institutions
5.	To carry on a temporary emergency care and rehabilitation posts in public places under the tents or in pavilions	In towns and cities the measure will save many lives during the critical periods of heat waves
6.	To strengthen the training process of medical colleges or/and to imply medical residents	Due to the lack of trained medical assistants in urban health centers there is a necessity to dispose of an additional number of them
7.	To assure a proper dissemination of information via mass-media	Everywhere is a necessity in proper dissemination of information via mass-media now
8.	To assure scientific investigations and to accumulate scientific data and experience concerning the hazard and the unfavorable impact of extreme climate change phenomenon of local urban population	Taken into account the fact that in every town/city heat waves impact on health depends on local peculiarities, there is a necessity to monitor the consequences

Table 2.5.2. The operational measures undertaken by public service providers: *Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat.*

S No	Main Actors	Measures identified to overcome the barriers
1.	Territorial health centers:	<ul style="list-style-type: none"> ○ To promote the provisional posts of medical emergency care and prompt rehabilitation during critical period of heat; ○ To ensure the provisional posts of medical emergency care and prompt rehabilitation with skilled personnel; ○ To ensure the provisional posts of medical emergency care and prompt rehabilitation with tools, medical equipment, medicines, consumption materials etc. ; ○ To ensure the proper functioning of the provisional posts of medical emergency care and prompt rehabilitation during critical period of heat waves
2.	Public Health Centers	<ul style="list-style-type: none"> ○ To monitor the public health status in relation with meteorological parameters; ○ To carry on informing companies regarding the urgent measures during critical periods of heat waves and other extreme phenomena and regarding adjustment measures for the vulnerable groups of population.
3.	State Hydro meteorology Service	<ul style="list-style-type: none"> ○ To monitor meteorological parameters in all geographical areas of the country; ○ To forecast the extreme phenomena of climate change; ○ To estimate gravity and duration of extreme phenomena of climate change; ○ Together with National Public Health Center to communicate information concerning gravity and duration of extreme phenomena of climate change and the degree of urgency of the climate change phenomena to central and local public administration authorities and relevant services;

Republic of Moldova

		<ul style="list-style-type: none"> ○ To elaborate and to present in central and local public administration authorities and relevant services proposals regarding declaration of emergency of extreme phenomena/cancellation of climate change.
4.	Local public administration authorities	<ul style="list-style-type: none"> ○ To make decisions regarding the number of the provisional posts of medical emergency care and prompt rehabilitation during critical period of heat; ○ To make a decision about the duration of operation of the provisional posts of medical emergency care and prompt rehabilitation during critical period of heat; ○ To make a decision what Territorial Health Centers will assure the activities of provisional posts of medical emergency care and prompt rehabilitation during critical period of heat; ○ To contribute financially to the functioning of provisional posts of medical emergency care and prompt rehabilitation during critical period of heat.
5.	The national company for health insurance	<ul style="list-style-type: none"> ○ To assure financial coverage of primary urgent medical care and rehabilitation rendered to population by the provisional posts of medical emergency care and prompt rehabilitation during critical period of heat during heat waves.
6.	Territorial services of maintaining public order	<ul style="list-style-type: none"> ○ To assure the proper public order throughout the period of their functioning were provisional posts of medical emergency care and prompt rehabilitation are dislocated.
7	Non-governmental organizations	<ul style="list-style-type: none"> ○ To assure wide communication of information relating to the degree of urgency of the extreme climate change phenomena; ○ To carry on companies of informing the general public about the measures for the adaptation of the population; ○ To contribute on mobilizing the community effort in implementing measures adapting to extreme climate change phenomena.

Table 2.5.3. Enabling environment of Rural population supply with potable water of guaranteed quality water health care measure.

S No	Enabling environment	Comments
1.	To elaborate an incentive mechanism for private resources attraction in durable development of national economy	It will attract the private investments and will reduce the pressure on national and local budgets
2.	To ask for more active participation of international donors in the implementation of the measures	It will accelerate the process of more complete water supply of rural localities
3.	To update the existing legal framework in order to strengthen it and develop the new regulations in this area	It will facilitate the process of water supply of rural localities and will contribute to economic and social development of rural area
4.	To conduct a national study on the estimation of reserves of underground water from sources both in terms of volume and quality for the subsequent argumentation of	It will assure a complete and durable water supply of rural area

Republic of Moldova

	the rural localities drinking water supply policy	
5.	To review government policy in investment activity, in order to invest means in adaptation to extreme phenomena of climate change	It will assure a high quality of life of the rural population
6.	To create a favorable climate for macroeconomic long-term sustainability investment in economic and social development of rural localities	It will accelerate the process of more complete water supply of rural localities and will assure a high quality of life of the rural population
7.	To develop and implement measures for attracting of decision-makers interest in designing and building of centralized water supply systems	It will contribute to economic development and will assure a high quality of life of the rural population
8.	To development institutional framework in the branch rural population centralized provision with drinking water of guaranteed quality	It will accelerate the process of more complete water supply of rural localities
9.	To elaborate a mechanism that would effectively eliminate the obstacles between the structures that develop and implement new water supply technologies	It will accelerate the process of more complete water supply of rural localities
10.	To strengthen the colleges and University's training process in technologies of drinking water supply of rural localities	It will assure the rural localities with specialists in technologies of drinking water supply
11.	To intensify the measures for informing the population in rural localities in problems of supplying with drinking water of guaranteed quality	It will help the rural population in the decision making process
12.	To involve NGO, mass-media and other organizations in rural localities in problems of supplying with drinking water of guaranteed quality	It will help the rural population in the decision making process
16.	To develop and implement appropriate and efficient mechanisms in order to monitor the social effectiveness of developed and implemented measures in rural area water supply	It will help to estimate the effectiveness of undertaking measures and to map out the future activities

Table 2.5.4. The operational measures undertaken by public service providers for Rural population supply with potable water of guaranteed quality. Building of local water supply systems.

S No	Main Actors	Measures identified to overcome the barriers
1.	Central public administration authority	<ul style="list-style-type: none"> ○ To update the existing legal framework in order to strengthen it and develop the new regulations in this area; ○ To ask for more active participation of international donors in the implementation of the measures; ○ To assure a national study on the estimation of reserves of underground water from sources both in terms of volume and quality for the subsequent argumentation of the rural localities drinking water supply policy;

Republic of Moldova

		<ul style="list-style-type: none"> ○ To review government policy in investment activity, in order to invest meaning in adaptation to extreme phenomena of climate change; ○ To create a favorable climate for macroeconomic long-term sustainability investment in economic and social development of rural localities; ○ To develop and implement measures for attracting of decision-makers interest in designing and building of centralized water supply systems ○ To assure improving of the training process in colleges and universities in technologies of drinking water supply of rural localities; ○ To develop and implement appropriate and efficient mechanisms in order to monitor the social effectiveness of developed and implemented measures in rural area water supply.
4.	Local public administration authorities	<ul style="list-style-type: none"> ○ To elaborate an incentive mechanism for private resources attraction in durable development of local centralized water supply system; ○ To develop in the rural area institutional framework responsible for the centralized provision of population with drinking water of guaranteed quality; ○ To involve rural NGO and mass-media in the development process of local potable water supply.
5.	Service providers	<ul style="list-style-type: none"> ○ To develop centralized water supply systems in rural localities.
6.	Centers of public health	<ul style="list-style-type: none"> ○ To monitor the public health status in relation to the potable water quality and to work out relevant recommendations; ○ To carry on informing companies regarding the requirements for potable water supply systems and urgent measures to be taken during critical period of heat waves and other extreme phenomena.

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Annexes 1-4

Annex I. Problem trees, Objective trees and Market Mapping

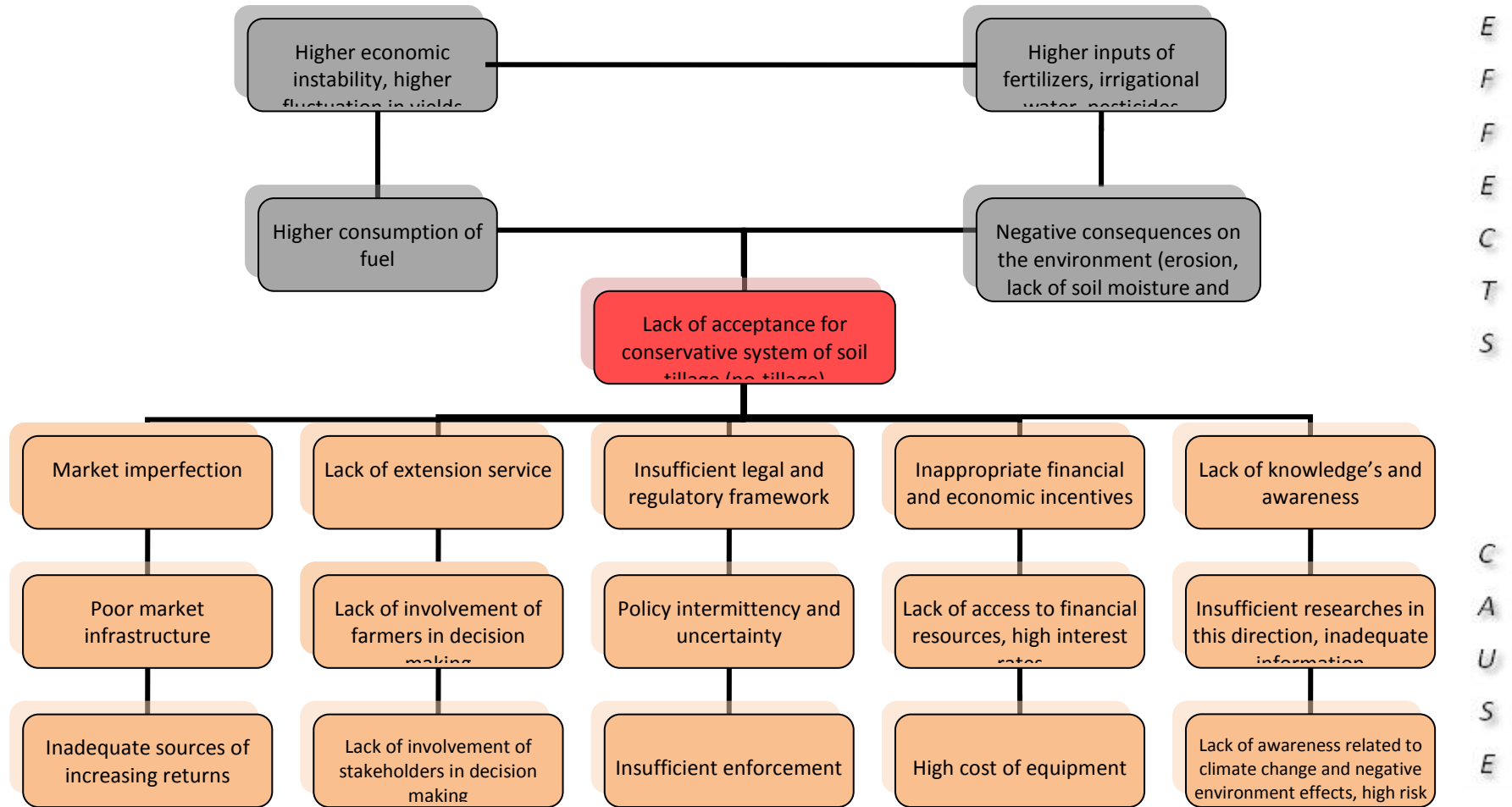


Fig. 1. Logical Problem Analysis of technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology. Problem tree

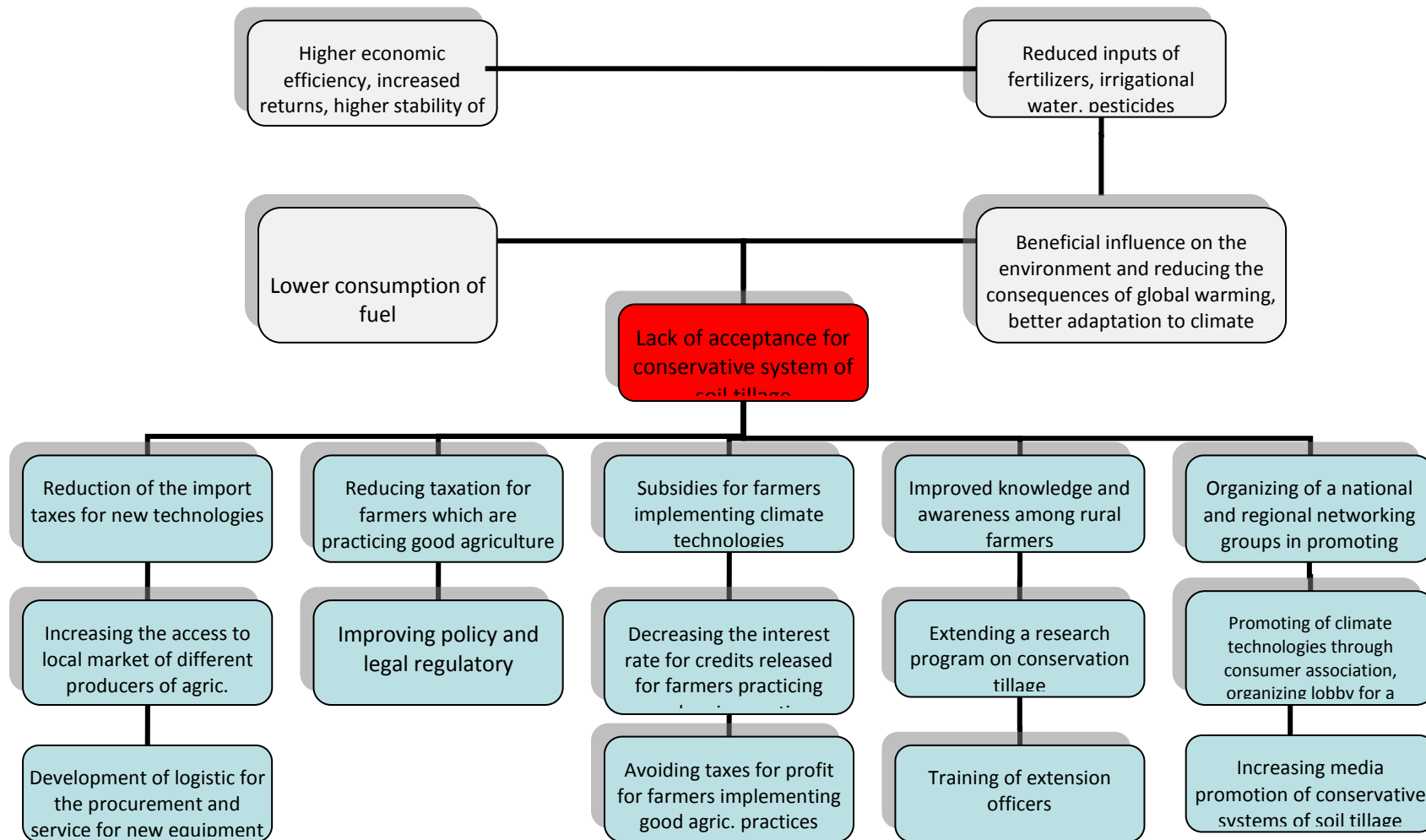


Fig. 2. Logical Problem Analysis of technology transfer for Conservation system of soil tillage without herbicides for winter wheat technology. Objective tree.

Republic of Moldova

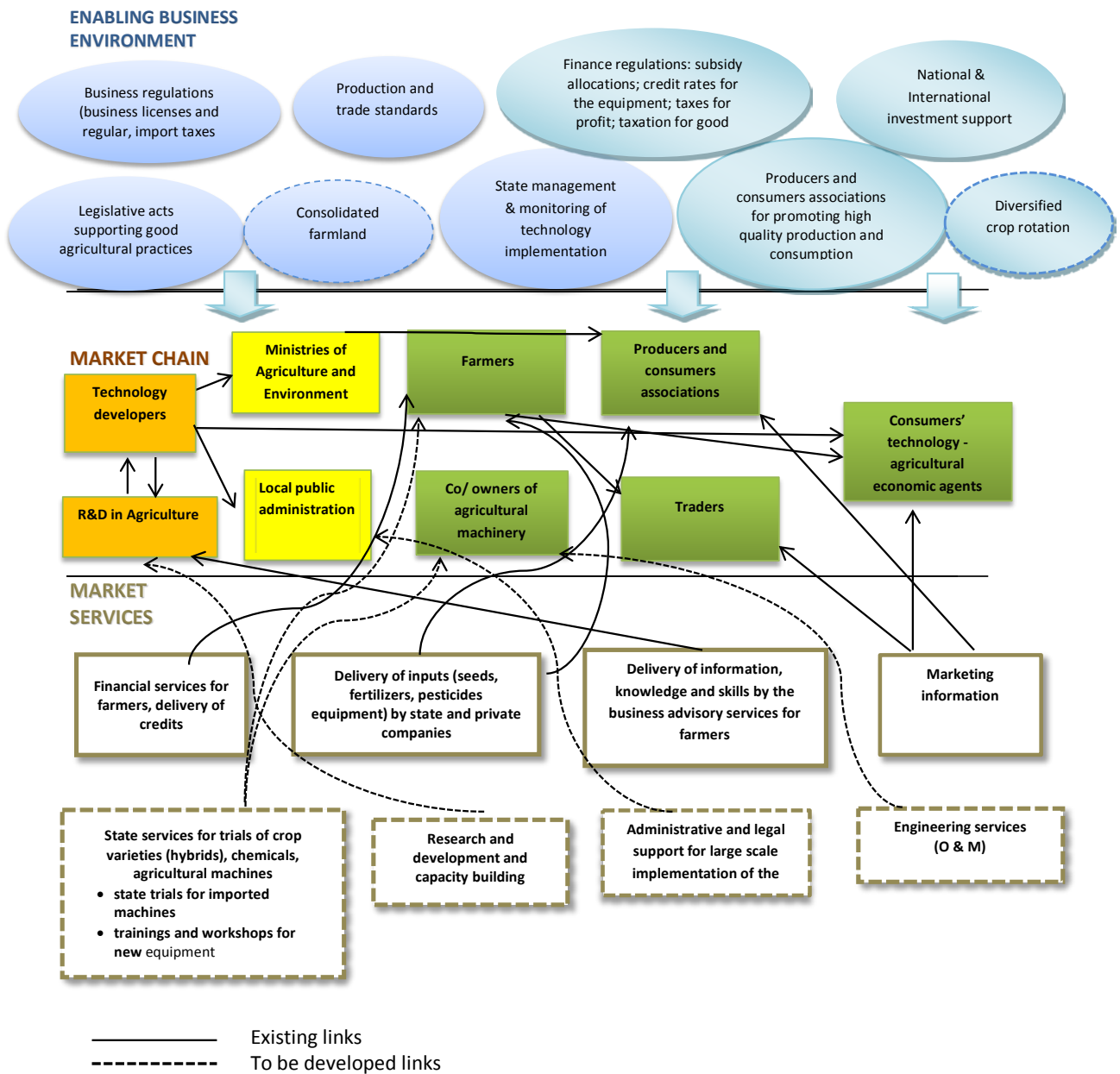
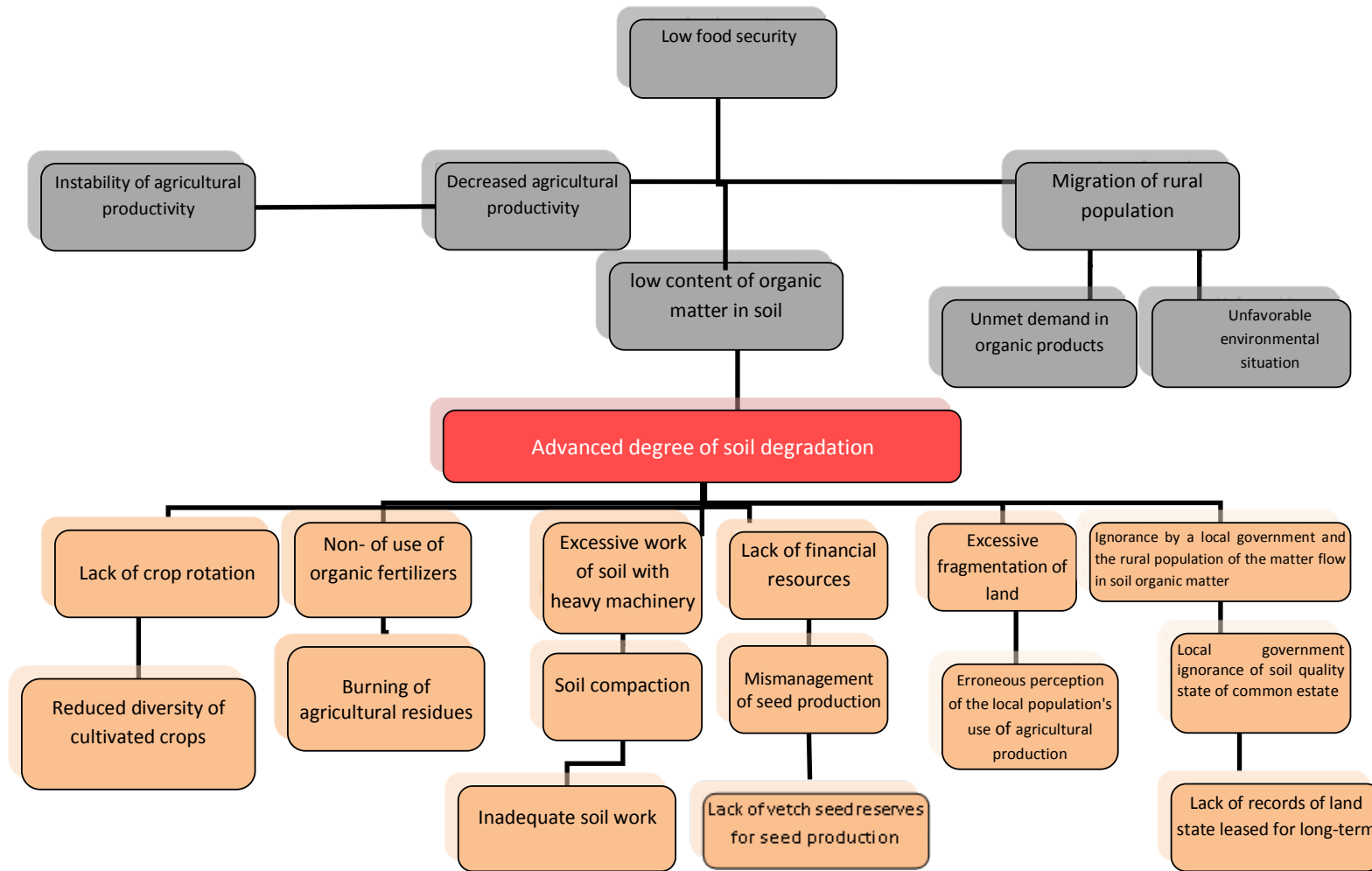


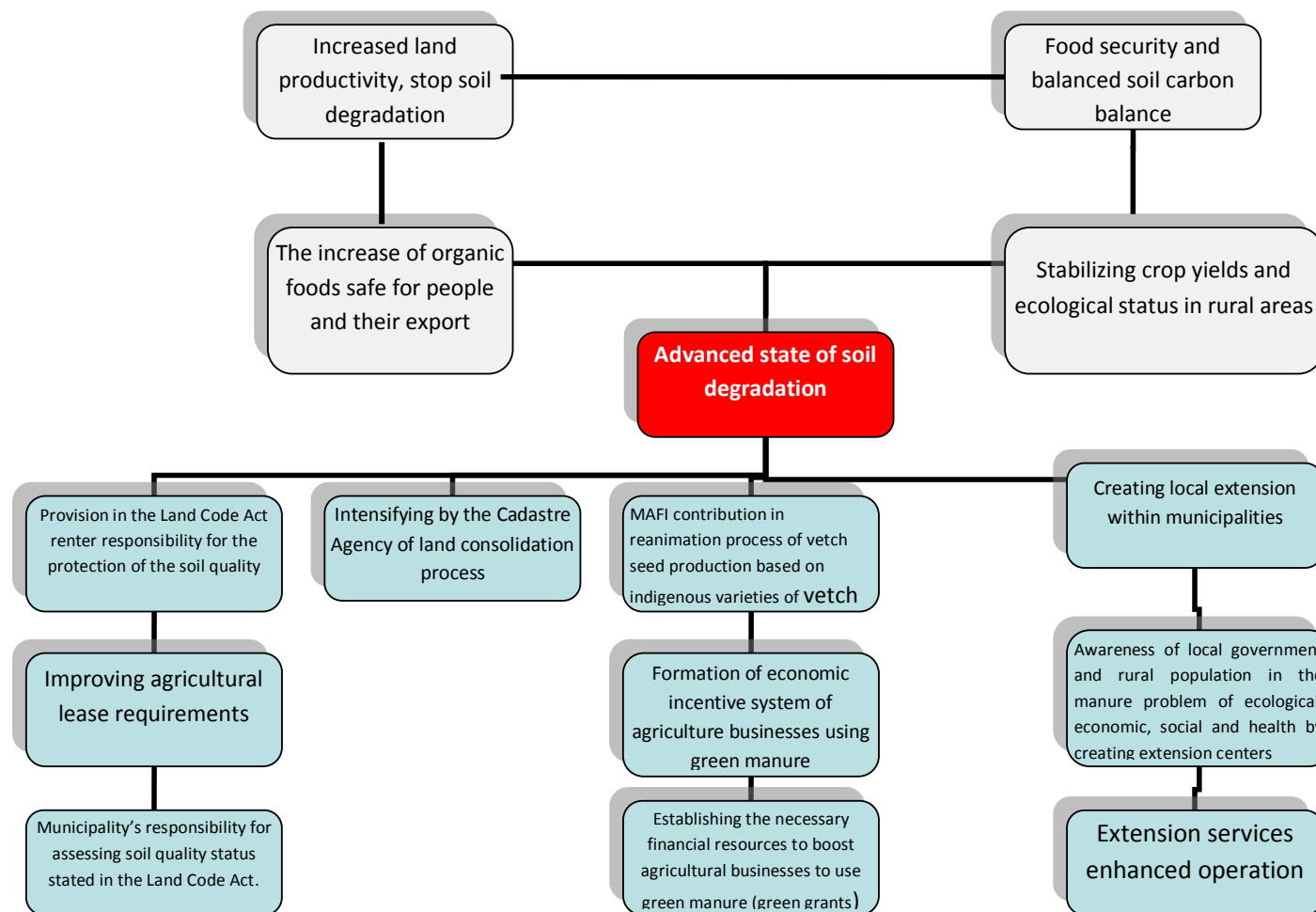
Fig.3. Market Map of Conservation system of soil tillage without herbicide for winter wheat technology.



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Fig.4. Logical Problem Analysis of technology transfer for Vetch field as green fertilizer into 5 year crop rotation technology. Problem tree.



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Fig.5. Logical Problem Analysis of technology transfer for Vetch field as green fertilizer into 5 year crop rotation technology. Objective tree.

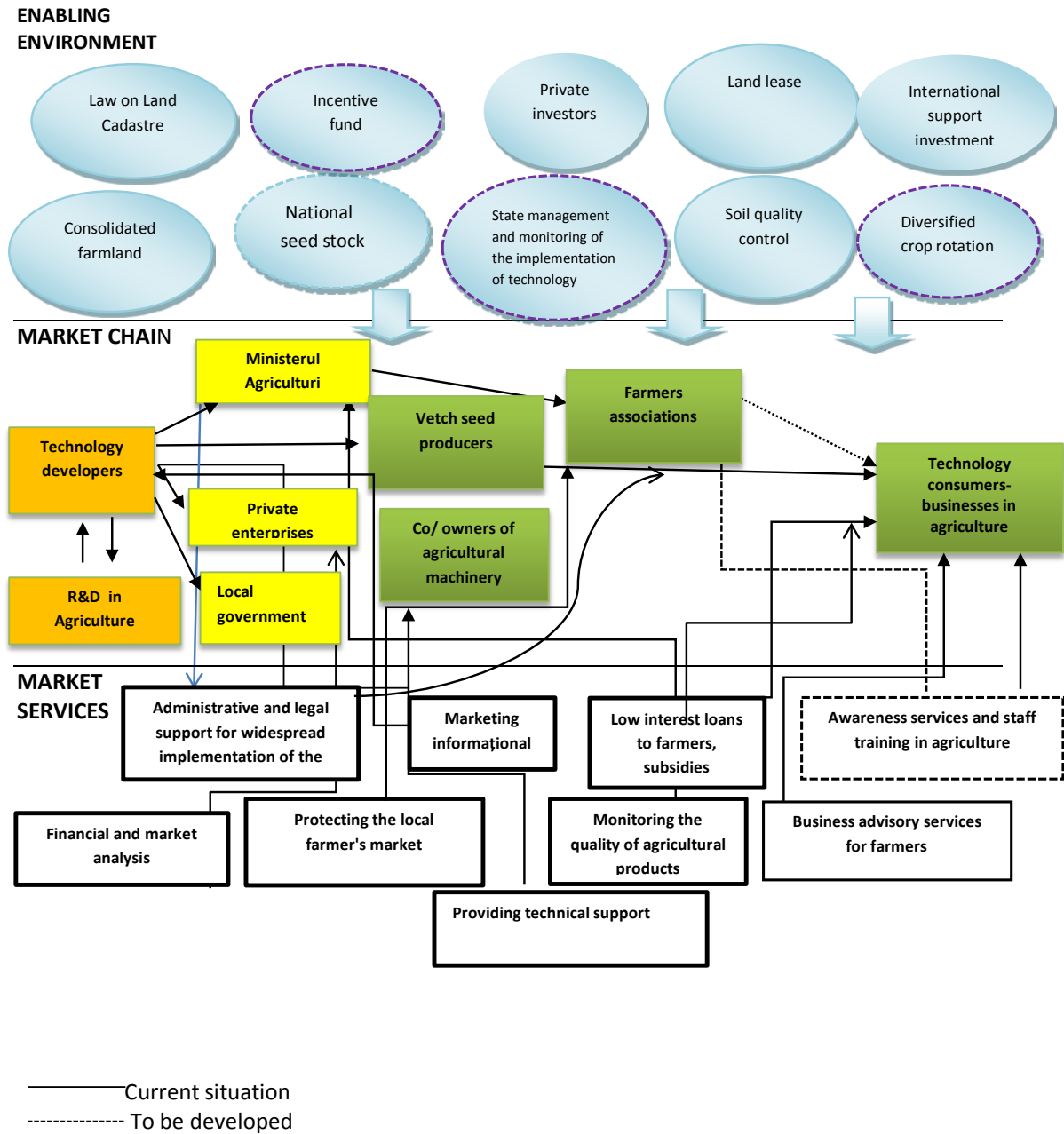
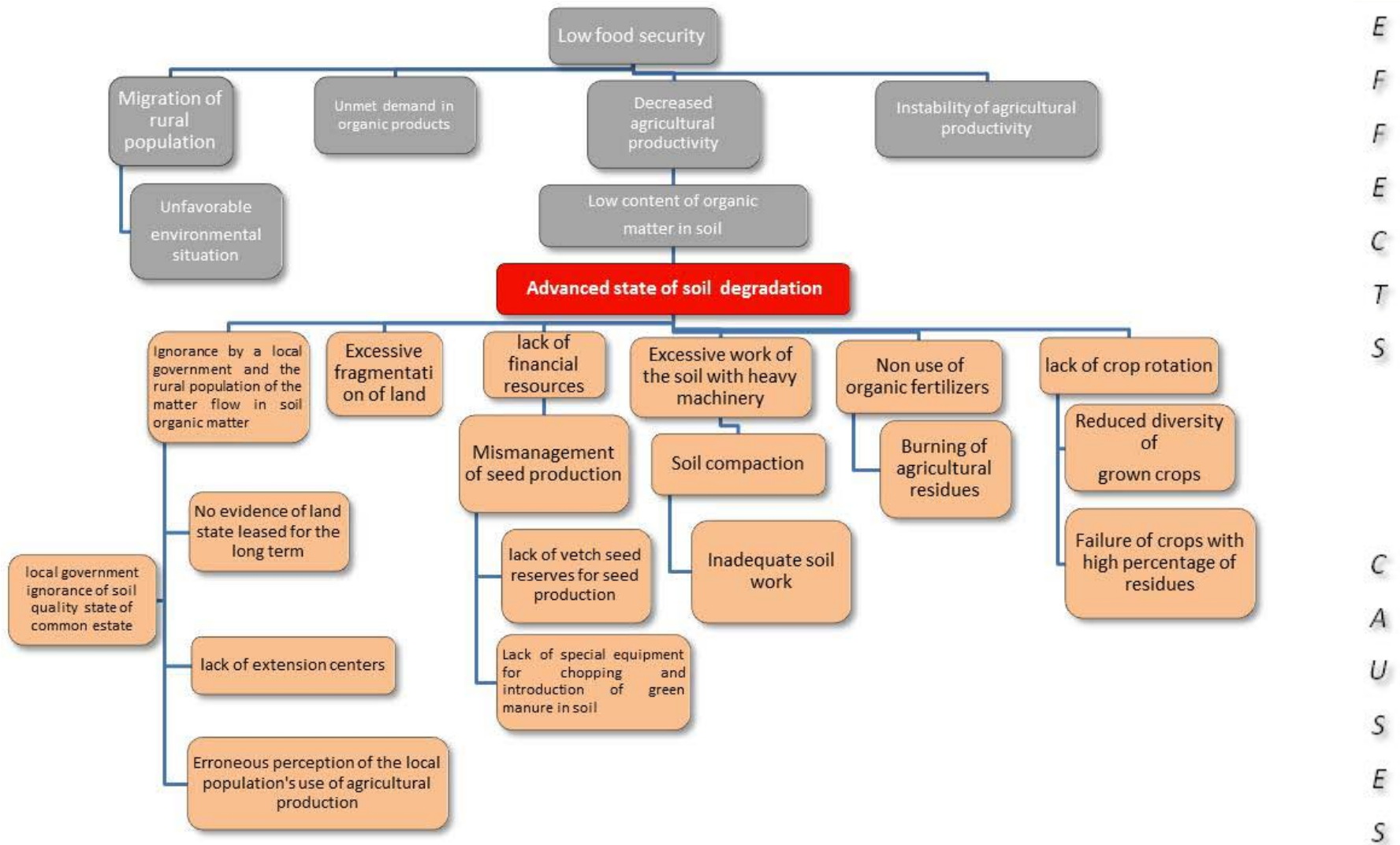


Fig.6. Market mapping of Vetch field as green fertilizer into 5 year crop rotation technology.

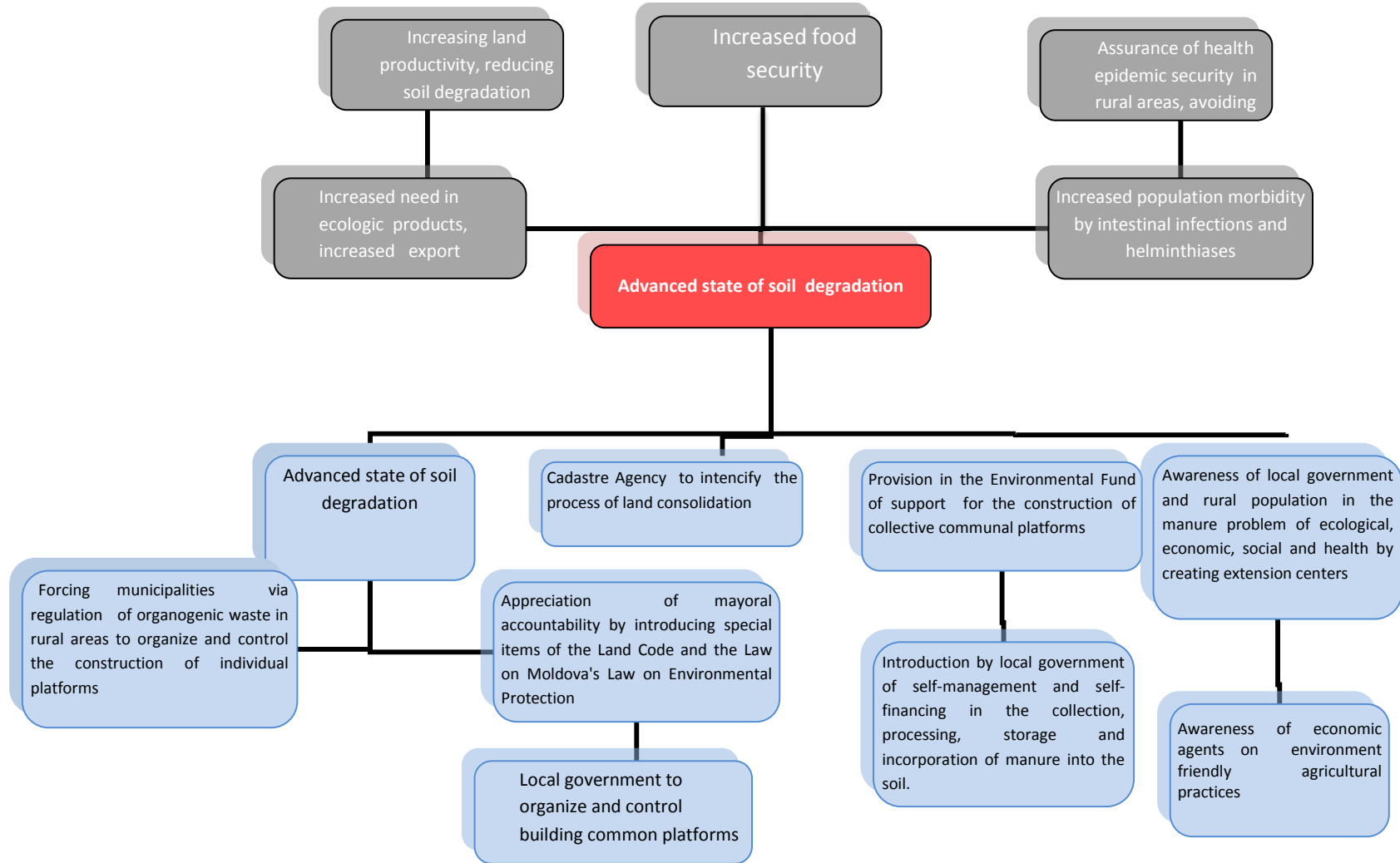


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Fig.7. Logical Problem Analysis of technology transfer for Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology. Problem

Tree.



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Fig.8. Logical Problem Analysis (LPA) of technology transfer for Applying 50t/ha manure with bedding to agricultural soils once per five years. Objective Tree.

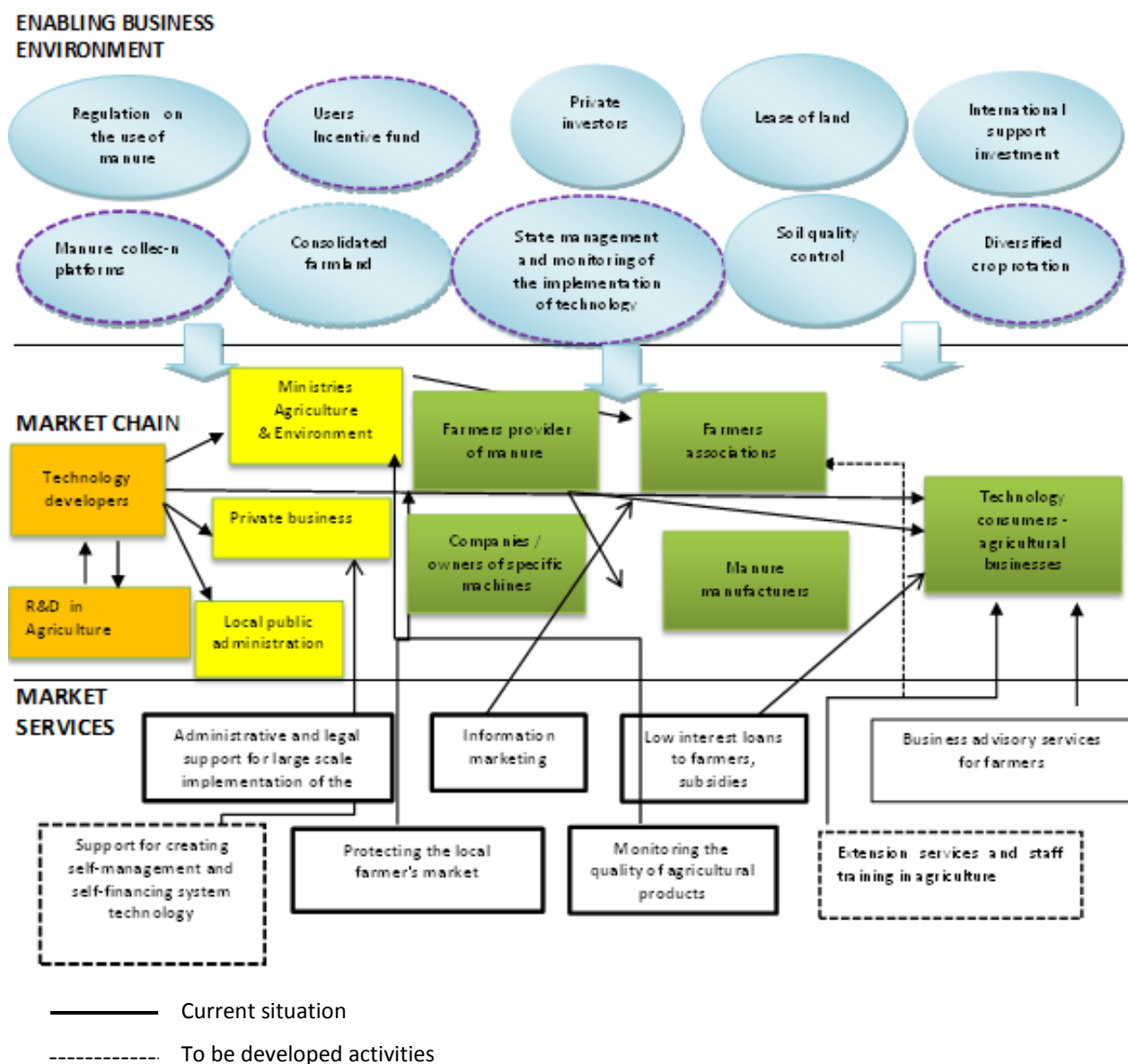
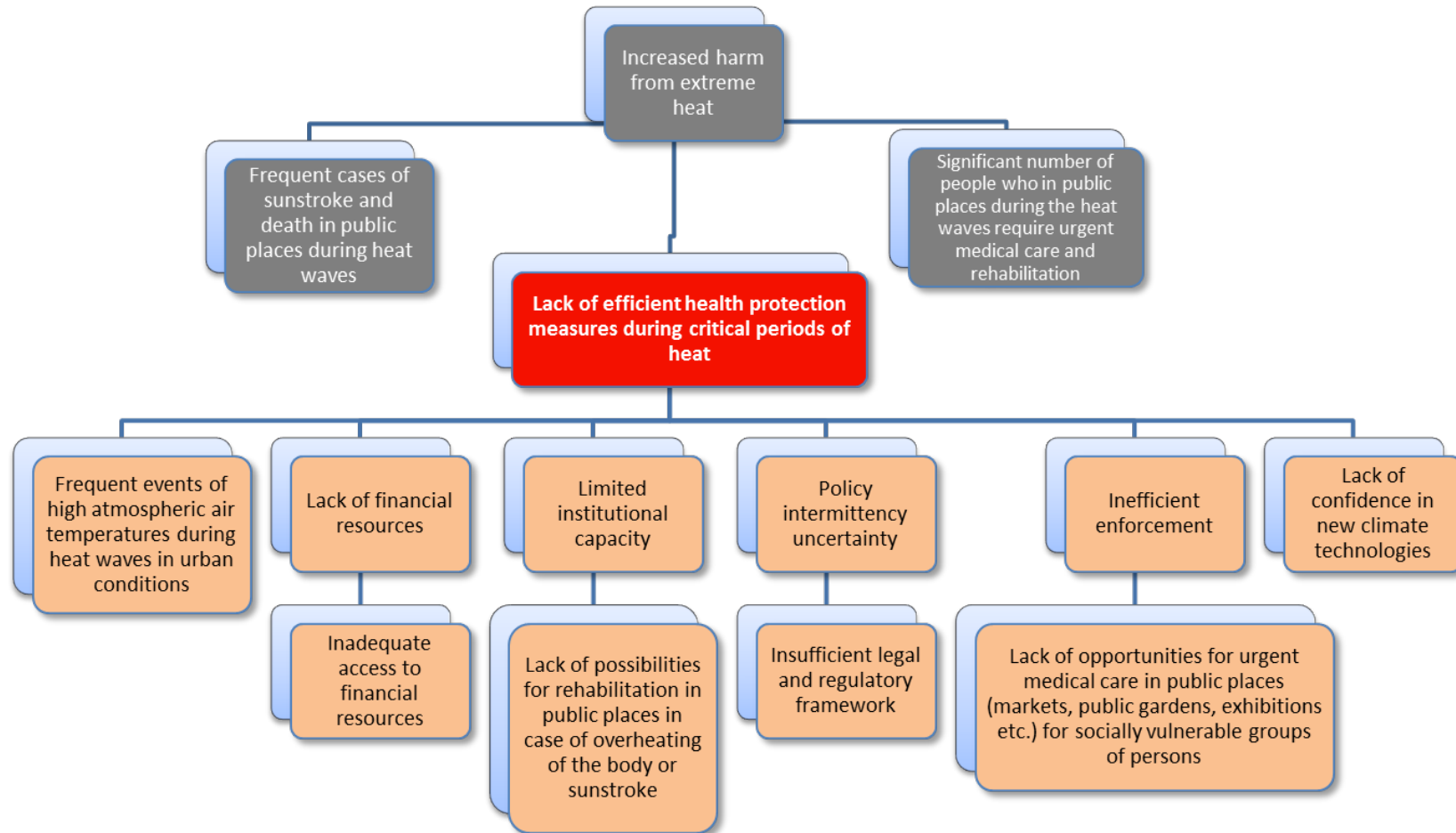


Fig.9. Market mapping of Applying of 50 t/ha of manure with bedding to agricultural soils once per five years technology.

HUMAN HEALTH SECTOR

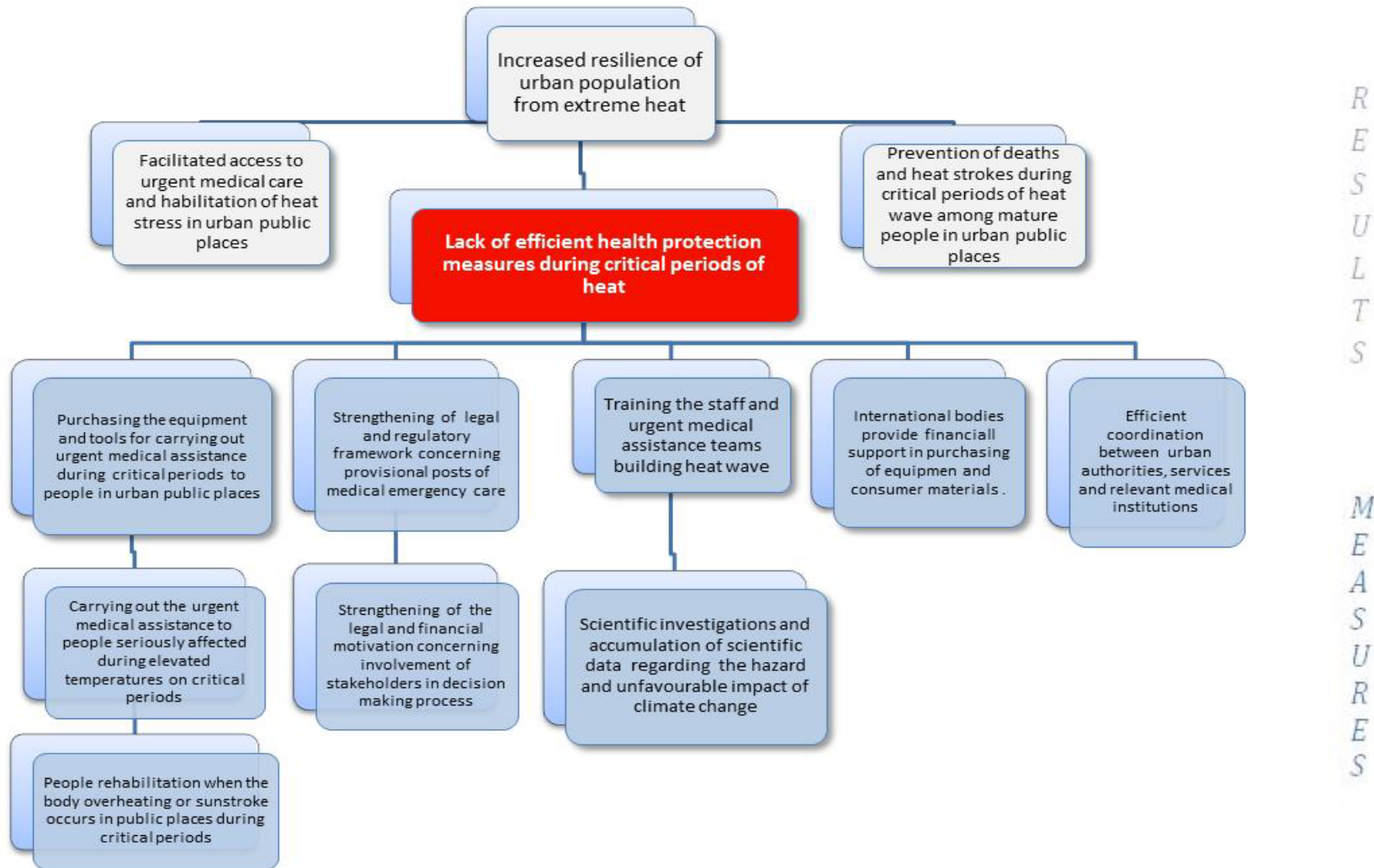


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Fig.10. Logical Problem Analysis of technology transfer of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves health care measure. Problem Tree.



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Fig.11. Logical Problem Analysis of technology transfer of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves health care measure. Objective tree.

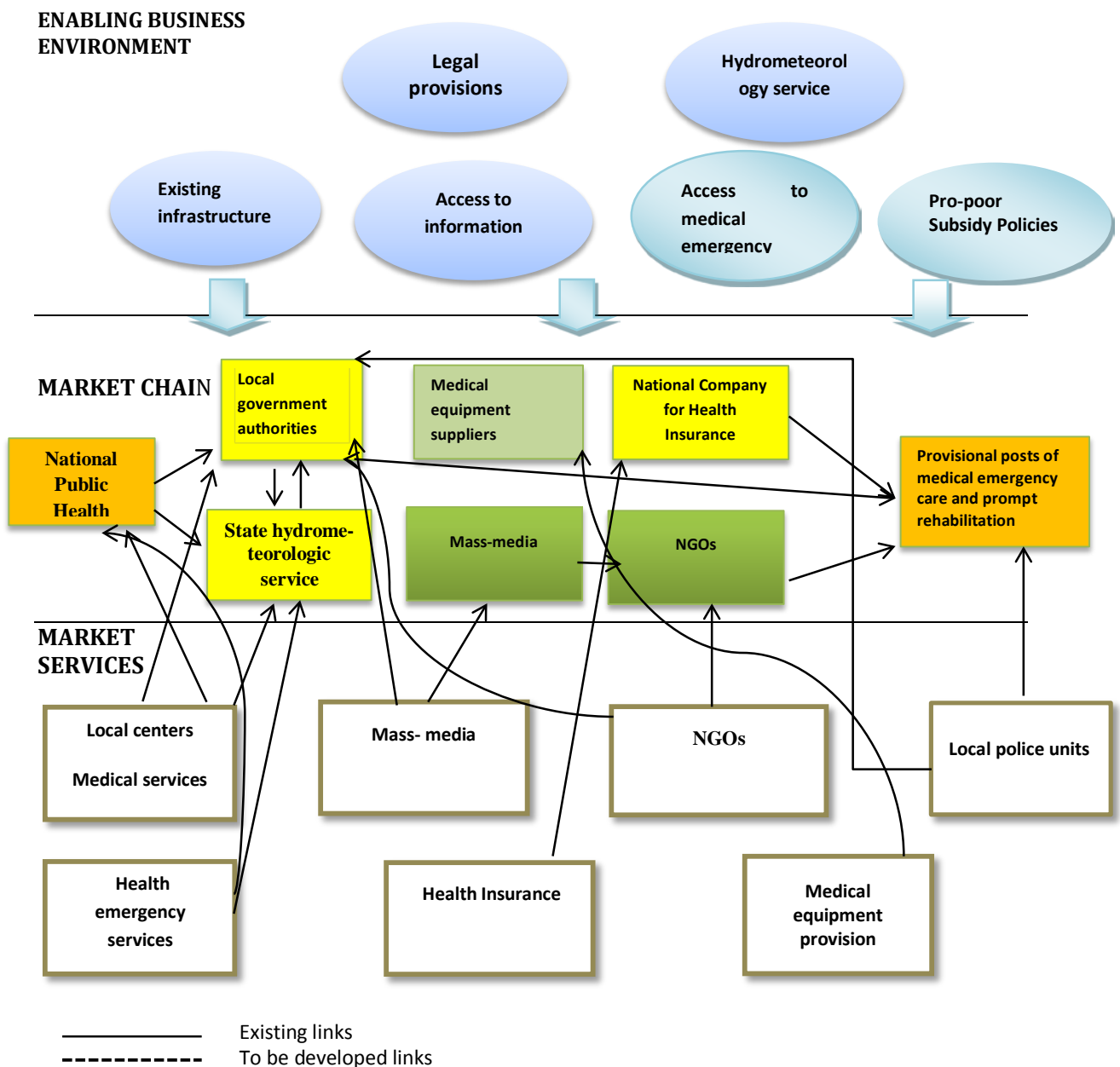


Fig.12. Market mapping of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat wave health care measure.

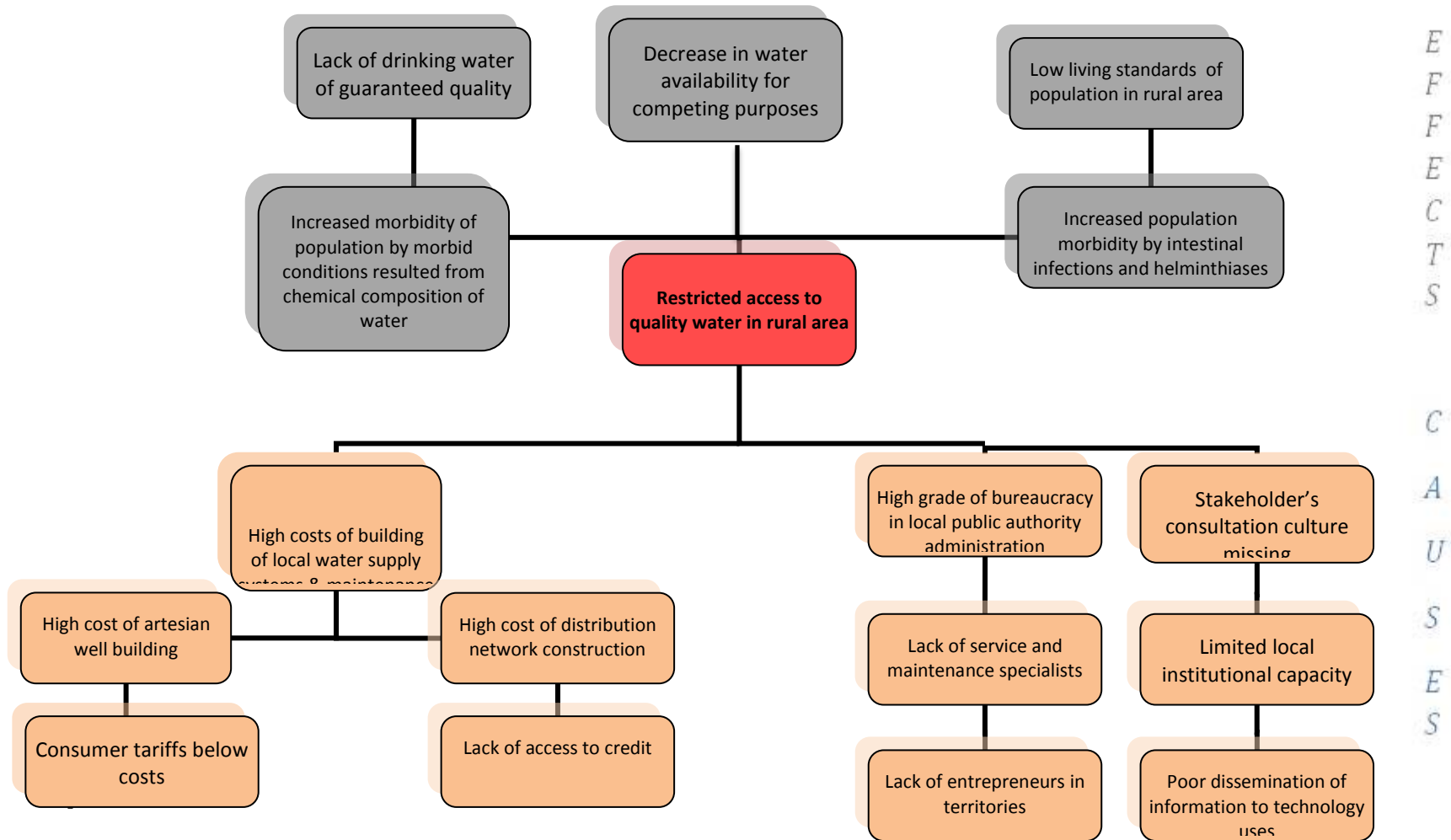
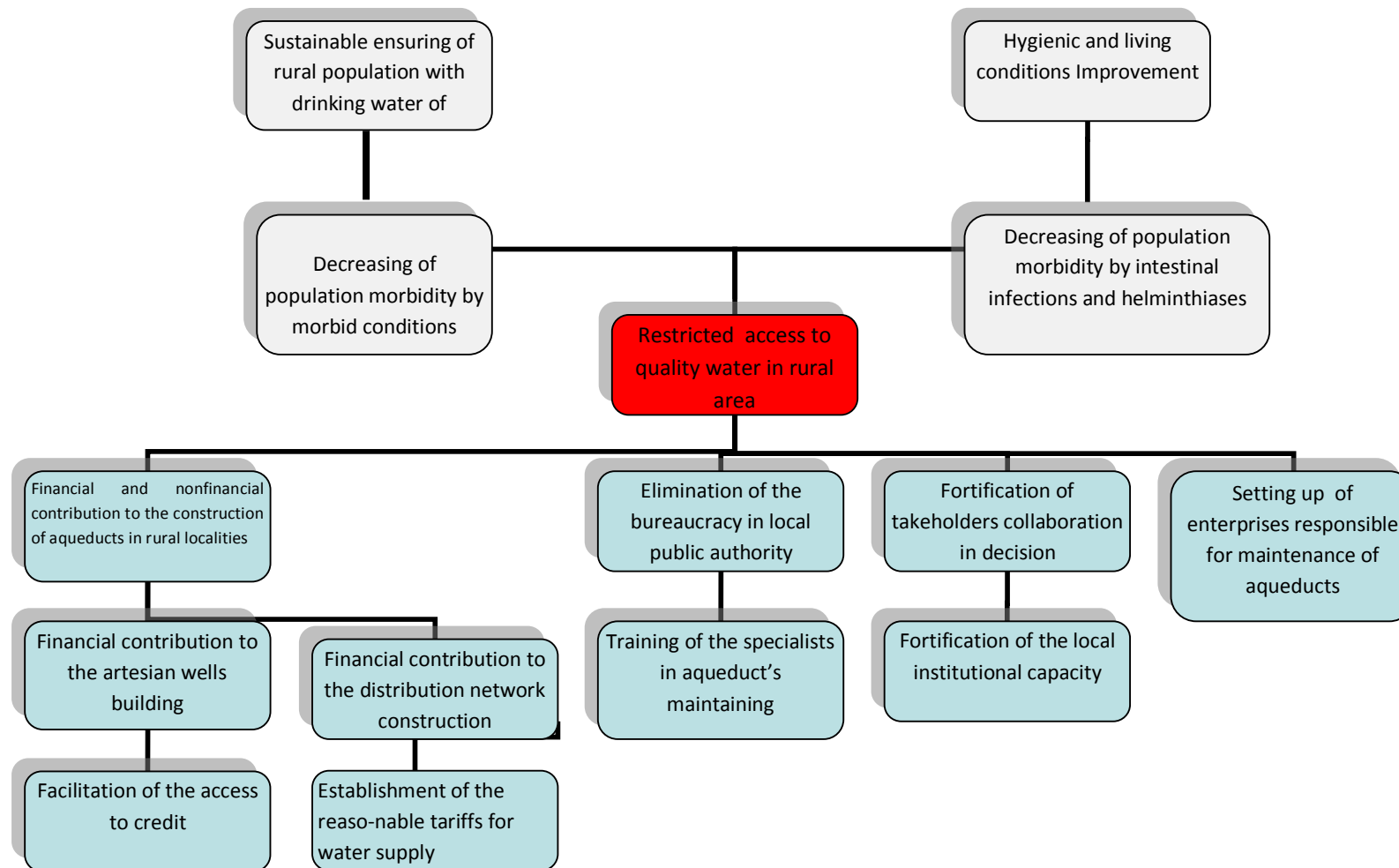


Fig.13 Logical Problem Analysis (LPA) of technology transfer for Rural population supply with drinking water of guaranteed quality. Building of local water supply systems. Problem Tree.



Republic of Moldova

Fig.14. Logical Problem Analysis (LPA) of technology transfer for Rural population supply with drinking water of guaranteed quality. Building of local water supply systems.Objective tree.

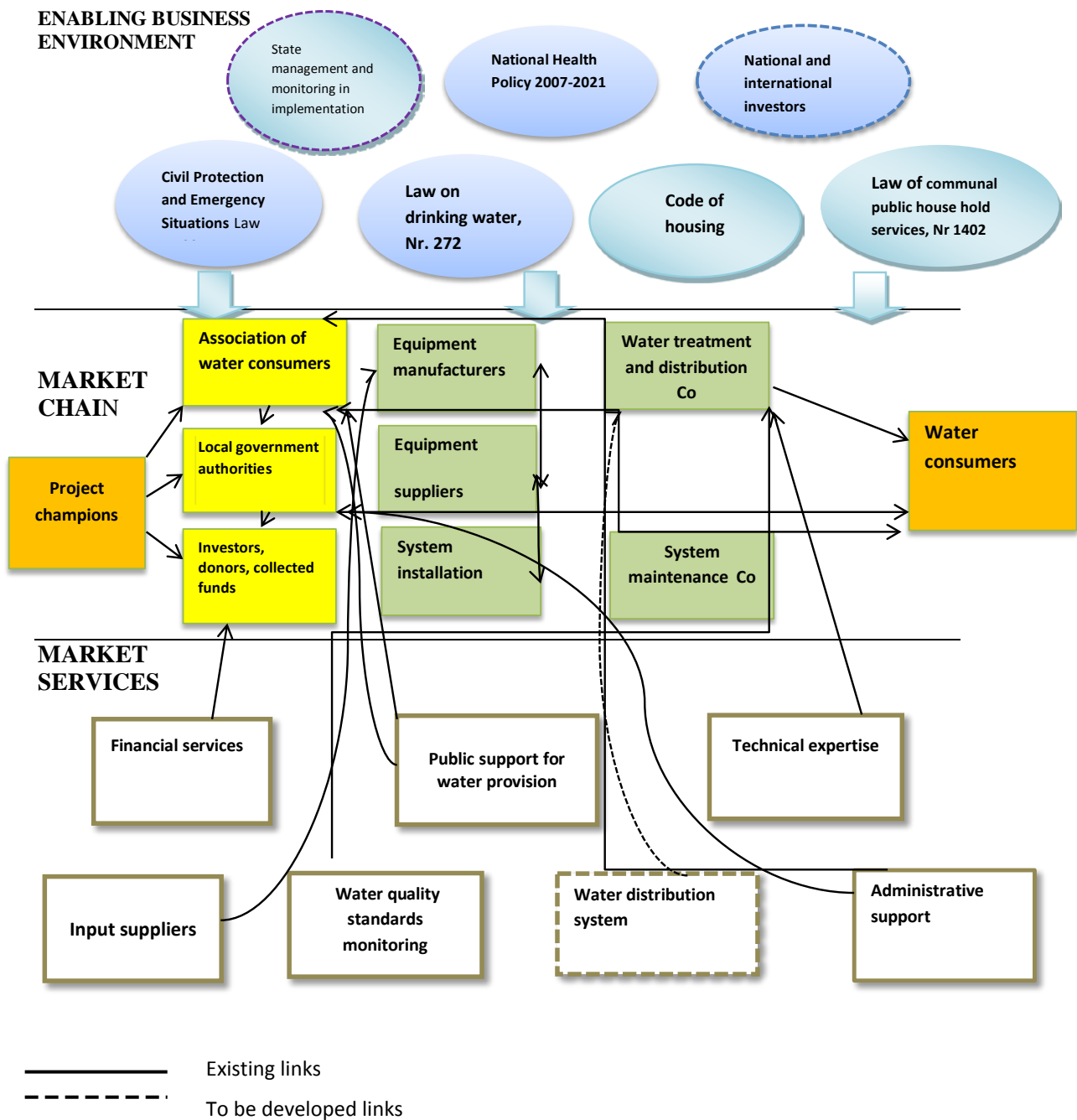


Fig.15. Market mapping of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology

Annex II. List of stakeholders involved and their contacts

- 1) Ministry of Environment: (Maria Nagornii, Chief of Department for Analysis, Monitoring and Evaluation of politics, tel 373-22-204520).
- 2) Ministry of Economy (Cristina Guriev, Deputy Chief, Department of Thermoenergetics, tel 373-22- 23-32-67
- 3) Ministry of Agriculture and Food Industry (Iurie Senic, Chief of Department Ecological Agriculture, Renewable resources and irrigation, tel 373-22-233427)
- 4) Institute of Power Engineering of the Academy of Sciences of Moldova (Sergiu Robu, tel, 373-22-727-040)
- 5) Institute of Ecology and Geography of the Academy of Sciences of Moldova (Maria Sandu, Deputy Director, tel 373-22-211-134)
- 6) Technical State University (Petru Todos, Deputy Rector, tel 373-22-235-400)
- 7) State Agrarian University of Moldova (Ion Bacean, associate professor, tell 373-22-432-258)
- 8) Ministry of Health (Ion Salaru, Deputy Director, National Center for Public Health. Tel 373-22-574-666)
- 9) State Hydrometeorological Service (Elina Plesca, Deputy Director, tel 373-22-773-511)
- 10) National Agency for Energy Regulation (Anatolie Boscaneanu, main specialist, Direction Regulation and Licensing, tel 373-22-544-936).
- 11) State University of Medicine and Pharmaceuticals of Moldova “Nicolae Testimiteanu” (Grigore Friptuleac, Chief of the Department Preventive Medicine tel 373-22-205-464
- 12) NGO “Ecospectr” (Alexandru Teleuta, Director, tel 373-22-523-898)
- 13) NGO “Energie Plus” (Vice-Director, Anderi Chiciuc, tel 373-22-237-619

Annex III. Policy Factsheets and Cost-benefit Analysis

AGRICULTURE SECTOR

AIII.1. *Conservation system of soil tillage without herbicides for winter wheat technology.*

AIII.1.1 POLICY FACT SHEET for *Conservation system of soil tillage without herbicides for winter wheat technology.*

Policy: Name of Policy	Promoting sustainable farming systems in the Republic of Moldova
Name of field	Agriculture
Date Effective:	This policy came into force during the last decades as a result of failure of conventional agriculture to solve the environmental problems
Date announced:	The policy was announced by the Ministry of Ecology in 1995 and by the Ministry of Agriculture in 2000.
Date Promulgated:	There is a Strategy for Sustainable development worked out by the Ministry of Ecology (1995) and the strategy for sustainable Development of Agriculture worked out by the Ministry of Agriculture (2005)
Date Ended:	The policy has remained in force
Unit:	Climate Change: CC
Country	Republic of Moldova
Year:	The policy came into force in 2005
Policy Status:	In force
Agency:	Ministry of Agriculture and Food Industry; Ministry of Ecology
Funding:	It is difficult to determine what is the share of public funding (national and international) for agriculture .The share of public funding for agriculture sector has increased in 2012 due to support from various international organizations as a result of severe drought.
Further information:	Promoting sustainable farming systems in the Republic of Moldova
Enforcement:	No particular enforcement measures
Penalty:	Moldova has the “Code of good agricultural Practices”, but no mechanism to enforce respecting this code
Related Policies	Ecological aspects of soil and water management. Social aspects of proper natural resource management etc. Law on ecological products Law on Moldova's accession to the Kyoto Protocol to the United Nations Framework Convention on Climate Change

	<p>Law on Drinking Water</p> <p>Law on Environmental Protection</p>
Stated Objective:	<p>Climate change adaptation; Ecosystem services; Water management; Biodiversity, changes in the structure of sowing areas by reducing the share of row crops up to 40%(at the moment 50%);restoring soil fertility; extending the area under drought resistant crops and varieties(hybrids); minimization of soil tillage, including no-till; a network of shelter belts etc.</p> <p>Ecosystem services are represented by services provided by farmers for the environment and society:</p> <ul style="list-style-type: none"> -carbon sequestration allows to improve soil quality, which reduces the negative influence of droughts, -"green water credits" allows to support good farm management practices oriented towards preventing pollution of ground waters with nitrates and pesticides, -creation of an ecological infrastructure, which allows to reduce the use of pesticides for pest control through increasing the beneficial fauna, including entomofauna. <p>Water management is closely related to soil management at the landscape and field levels. By improving soil structure and by living crop residues on soil surface it is possible to prevent water pollution.</p> <p>Biodiversity is crucial for sustainable development. It includes: an optimal ratio between arable lands, forests, pastures, water reservoirs at the landscape level; respecting crop rotations, which reduces using of chemicals, which in their turn don't destroy the biodiversity; maintenance of soil fertility allows protecting soil ecology from deterioration etc.</p>
Evaluation:	The evaluation of the policy is done fragmentary without a holistic approach to different domain of influence (economic and social)
Policy type:	The policy should be oriented toward providing incentives for farmers which are providing a good ecosystem services.
Policy target:	Sustainable farming system including conservation system of soil tillage, will use more efficiently renewable sources of energy (from the sun) and non-renewable sources of energy. The coefficient of energy efficiency for conventional system of soil tillage on winter wheat is equal to 1,2-1,3 but for conservation system of soil tillage – 1,7-1,8
URL:	<p>www.mediu.gov.md</p> <p>www.maia.gov.md</p>
Description:	<p>Legislation exists in Moldova for majority of issues regarding effective use of soil, water, vegetation etc.</p> <p>The most important is that majority of legislative acts don't have real mechanisms for implementation – incentives for promoting good agricultural practices.</p> <p>The most important aspect is lack of holistic approach to resources management, which could allow to find solutions for majority of problems in agriculture by respecting a holistic vision</p>

AIII.1.2. Economic-financial analysis of *Conservation system of soil tillage without herbicides for winter wheat* technology supported by policy and regulatory path mentioned in the Report.

Table 1.1. Initial data for cost-benefit analysis

Indicator	Amount
1. Arable land sown with winter wheat, ha	340200
2. Operational costs per 1 ha, €	260
3. Number of mechanized technological stations, unit.*	210
4. Sales price of a combine, thousand €	7
5. Needed number of combines, units	3240
6. Mechanic's labour remuneration, including social fund contributions, per 1 ha, €	1,5
7. Consumption of diesel oil and lubricants per 1 ha, €	15

Table 1.2. Needed investments

Indicator	Amount
1. Purchasing of combines, thousand €	22680

Table 1.3. Operational costs

Indicator	Amount
1. Consumption of diesel oil and lubricants, thousand €	5103
2. Labour retribution fund, thousand €	510,3
3. Equipment maintenance works, thousand €	2268
Total	7881,3

While making the calculations it was assumed that combines for this technology will be purchased and provided to the mechanized technological stations in the country. Table 1.3 states the operating costs according to labour standards.

All.1.3 Cost Effectiveness Analysis of *Conservation system of soil tillage without herbicides for winter wheat technology.*

This technology is aimed at preserving organic composition of soil and soil erosion by applying no-tillage system by optimizing processing work. Thus, the no-tillage system can help lower costs of diesel and oil, labour remuneration and other expenses related to wheat cultivation by 4 times. Application of this technology is provided in full for the total area sown with winter wheat in the country, approx. 340 000 ha. Its applicability can be easily done at farm type and level of farmer households. Agricultural machinery needed was provided in relation to 1:100 ha. Such ratio will allow the exploitation of agricultural equipment for over 10 years. The area that refers to a machine will offer great opportunities for producers, technology machines resorts, but also small peasant farms to buy this machine under different modes: credit, leasing, financial consortium. In the table below we present forecasting costs presented for each particular year of no-tillage system compared to the traditional system.

From the table data one can conclude, that no-tillage system application for winter wheat crop growing has cost advantages over traditional technology. Calculations show that in the case of no-tillage system for a period of 11 years, during which they may renew the fleet of agricultural equipment, total costs come to € 11.459 million. In the traditional(conventional) system that currently apply without additional investment to renovate park agricultural equipment the costs range from approx. 31 000 € for the first year and up to 36 000 € in the 11th. Therefore, one can conclude that the application of no-tillage system under long-term exploitation is more effective given the relatively low costs compared to the traditional system.

Table 1.4. Cost Effectiveness Analysis of *Conservation system of soil tillage without herbicides for winter wheat technology.*

Category	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11
no-tillage											
Investments th €	22680	2268	2268	2268	2268	2268	2268	2268	2268	2268	2268
Costs, th €	7881,3	7881,3	7881,3	8275,365	8295,068	8296,053	8710,856	8731,596	8732,633	9169,265	9191,096
Total costs, th €	30561,3	10149,3	10149,3	10543,37	10563,07	10564,05	10978,86	10999,6	11000,63	11437,26	11459,1
traditional											
Investments th €	0	0	0	0	0	0	0	0	0	0	0
Costs, th €	31525,2	31525,2	31525,2	33101,46	33180,27	33184,21	34843,42	34926,38	34930,53	36677,06	36764,39

AIII.2. Vetch field as green fertilizer into 5 year crop rotation technology.

AIII.2.1 POLICY FACT SHEET for Vetch field as green fertilizer into 5 year crop rotation technology.

Minimum requirements	
Recommended/ good to have	
POLICY: Name of Policy	The conservation and improvement of soil fertility for 2011-2020 years.
Name of field:	National policy in soil conservation
Date Effective:	20.08.2011
Date Announced:	26.08.2011 , Monitorul Oficial Nr. 139-145 art Nr : 696
Date Promulgated:	26.08.2011
Date Ended:	Is in effect until 2020 including
Unit:	Climate Change
Country:	Republic of Moldova
Year:	2011
Policy Status:	In force
Agency:	Ministry of Agriculture and Food Industry of Republic of Moldova
Funding:	State Budget, grants, private agricultural businesses
Further Information:	Accelerated degradation of soil resources called for the development and implementation of this program. The problem of maintaining productive capacity of agricultural land is a strategic national security concern. Implementation of environmentally benign agricultural methods to increase soil fertility will help ensure food security for the population and to produce the necessary volume of agricultural products for export.
Enforcement:	Implementation is carried out by the Ministry of Agriculture and Food Industry of Moldova
Penalty:	Formally there no penalties were foreseen
Related Policies:	National Strategy for sustainable development of agroindustrial complex Republic of Moldova (2008-2015); Complex program of recovery of degraded lands and improving soil fertility (2004).
Policy Superseded by:	Described policy cannot supersede
Policy Supersedes:	It is not relevant
Stated Objective:	Program objective is the long-term preservation of the quality and productive capacity of soils for food security of the country.

Evaluation:	The policy is newly approved and will be evaluated after implementation
Policy Type:	Government decision
Policy Target:	Development and improvement of technical and scientific work to ensure the completion of land reclamation, creation of information system of soil quality; Stopping active forms of degradation of the soil cover; Application of conservation and improvement of soil fertility.
URL:	Ministry of Agriculture and Food Industry of Republic of Moldova www.maia.gov.md
Legal References:	Land Code of the Republic of Moldova
Description:	The program provides the technical and scientific improvement and regulations regarding the research and land reclamation, soil and agrochemical research carried out for the creation of information system of soil quality, performance, based on the information gathered, projects: organizing hydrological erosion and land development agricultural application of phyto and agro-technical measures to prevent and combat erosion, the recultivation of lands damaged by performing soil improvement work (drainage, irrigation, combating soil salinization): to preserve and enhance soil fertility by: implementing regional crop rotations; application system for soil conservation works, cultivation of leguminous crops, application of organic and mineral fertilizers.

AI.2.2. Economic- financial analysis of Vetch field as green fertilizer into 5 year crop rotation technology supported by policy and regulatory path mentioned in the Report.

Table 2.1. Initial data to determine the needed investments

Indicator	Amount
1. Area sown with vetch for 1 year, ha	40000
2. Vetch crop as „green fertilizer ” in crop rotation, years	5
3. Total area sown with vetch for the rotation period, ha	200000
4. Price of 1 kg of seed, €	0,52
5. Average vetch sowing norm per 1 ha, kg	85
6. Number of yields per year, times	2
7. Cost of seeds for 1 year period per 1 ha, €	88,4
8. Cost of a chopper to incorporate the vetch green mass in soil, thousand €	20
7. Area covered by one chopper to incorporate the green mass per year, ha	200
8. Number of choppers needed for one year of rotation, units	200
9. Cost of choppers, thousand €	4000
10. Consumption of inputs per 1 ha (diesel oil, lubricants), €	16

11. Labour retribution fund, including social fund contribution, thousand €	1,5
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Exchange rate leu/€ = 15,4 lei/1 €

Table 2.2. General analysis of costs for an area of 40 thousand ha

Categories of indicators	Year I	Year II	Year III	Year IV	Year V
1. Capital investments, thousand €	4000	0	0	0	0
2. Material costs*, thousand €	4576	4576	4576	4576	4576
3. Labour retribution fund**, thousand €	60	60	60	60	60
Total, thousand €	8636	4636	4636	4636	4636

*- In this category of consumption only the cost of diesel oil and engine wear was determined, including repair and maintenance. Usually it is deemed to be 10% of the total value of the investment.

** - these calculations took into account the mandatory health insurance and payments for mandatory health insurance

Table 2.3. Investments needed to purchase equipment

Type of equipment	Units	Number of units	Price per unit, thousand €	Total price, thousand €
1. Chopper to incorporate vetch into soil *, thousand €	1	200	20	4000
Total	x	x	x	4000

* - the brand of the chopper is not indicated because suppliers offer a wide range of different equipment which varies depending on the tractor engine power. For such works as incorporating vetch into soil tractors with a minimum of 200 horse power are proposed.

Table 2.4. Operational costs

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Labour retribution fund, thousand €	60	60	60	60	60
2. Seeds costs , thousand €	3536	3536	3536	3536	3536
3. Fuel costs, thousand €	640	640	640	640	640
4. Fixed assets wear, thousand lei	400	400	400	400	400
Total operational costs, thousand €	4636	4636	4636	4636	4636

Table 2.5. Global yield of grain harvested as a result of using vetch in crop rotation

Crop	Year I	Year II	Year III	Year IV	Year V
1. Vetch, tons	-	-	-	-	-
2. Maize, tons	-	60000	-	-	-
3. Winter wheat, tons	-	-	48000	-	-
4. Peas, tons	-	-	-	32000	-
5. Sun flower, tons	-	-	-	-	20000

Table 2.6. Calculation of marginal contribution

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Income from increased yields of grain, thousand €	0	16200	12960	8640	5400
2. Operational costs, thousand €	4636	4636	4636	4636	4636
3. Marginal contribution (gross profit), thousand €	-4636	11564	8324	4004	764

AIII.2.3. Cost Effectiveness Analysis of Vetch field as green fertilizer into 5 year crop rotation technology

In the absence of seed production, this technology assumes that vetch crop will be grown for vetch seeds production and then used as green fertiliser.

The technology is developed based on grain yield growth over 5 years in the rotation sowing vetch rotation in the first year. From calculations obtained we conclude that the technology has a profitable growth based on harvest obtained and shown in table 2.5. Income from operating activities is a fleet size due to changes in grain commodity price influence depending on natural conditions, the market, the production obtained. These factors do not allow forecasting the technology for a longer period (more than 5 years).

Table 2.7. Cost Cost Effectiveness Analysis of Vetch field as green fertilizer into 5 year crop rotation technology

Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Benefits form operation th, €	0	16200	12960	8640	5400
2. Operational costs th €	4636	4636	4636	4636	4636
3. Net Benefits, th €	-4636	11564	8324	4004	764

AIII.3. Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.

AIII.3.1 POLICY FACT SHEET for *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology.*

Key:

Minimum requirements	
Recommended/ good to have	
POLICY: Name of Policy	Waste management, toxic substances, mineral fertilizers and pesticides. In: The Moldovan Law on Environmental Protection No. 1515-XII, Chapter VI
Name of field:	National policy in environmental protection.
Date Effective:	16. 06.93
Date Announced:	Monitor nr.10/283 din 30.10.1993
Date Promulgated:	30.10.1993
Date Ended:	The policy is in force
Unit:	Climate Change
Country:	Republic of Moldova
Year:	1993
Policy Status:	In force
Agency:	Ministry of Environment, the Moldovan Parliament
Funding:	National budget
Further Information:	In a separate chapter of the law the waste management is treated.
Enforcement:	Law is implemented on the day of publication (Decision Parl. No. 1516 of 16.06.93 on implementation)
Penalty:	There are penalties for unauthorized dumps creation
Related Policies:	The conservation and improvement of soil fertility for 2011-2020, approved by Government Decision no. 626 of 20.08.2011; Guide to organic fertilizers. Approved by the Scientific and Technical Council of the Ministry of Agriculture and Food Industry of Moldova, minute no. 1 of 26.01.2011
Policy Superseded by:	There is no any possibility to supersede
Policy Supersedes:	It is not relevant
Stated Objective:	Climate change adaptation. Soil improvement.
Evaluation:	Any evaluation of the policy do not exist now
Policy Type:	State policy
Policy Target:	Environmental protection, improving soil quality

Republic of Moldova

URL:	Ministry of Environment www.mediu.gov.md
Legal References:	The Moldovan Law on Environmental Protection No. 1515-XII, Chapter VI
Description:	Is outlined the State policy in the waste management and the penalties that can be imposed for breaches of this policy.

AIII.3.2 Economic- financial analysis of *Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology supported by policy and regulatory path mentioned in the Report.*

Table 3.1. Initial data to determine the investments needed for a communal platform

Indicator	Size
1. Average Number of individual farms to supply manure to a platform	800
2. Amount of manure supplied by an individual farm during one year	10
3. Capacity of one platform, m ³	8000
4. Cost of construction of one communal platform with a capacity of 8000 tons, thousand €	150
5. Purchasing price of 1 ton of manure from individual farms, €	10
6. Selling price of 1 ton of manure from the communal platform, €	30
7. Purchasing of 2 excavators for loading manure from the communal platform, thousand €	70
8. Purchasing of 2 tractors with a trailer to purchase manure from individual farms, thousand €	50
9. Purchasing of one bulldozer for placing and pressing the manure on the platform, thousand €	100
10. The surface incorporated with manure from a communal platform, ha	160
11. Labour retribution 1 man-hour for tractor-driver, €	3,75
12. Annual average number of man-hours worked by 1 tractor-driver, man-hours	2000
13. Labour retribution 1 man-hour for excavator operator, €	5
14. Annual average number of man-hours worked by 1 excavator operator, man-hours	1500
15. Labour retribution 1 man-hour for a bulldozer operator, €	4
16. Annual average number of man-hours worked by one bulldozer operator, man-hours	1500
17. Average consumption of diesel oil calculated per one hour of machine work, litres	12
18. Price per 1 litre of diesel oil, €	1

Table 3.2. Investments needs and current expenditures for the first five years of a communal platform work

Categories of indicators	Year I	Year II	Year III	Year IV	Year V
1. Capital investments, thousand €	370	0	0	0	0
2. Material costs*, thousand €	105,7	105,7	105,7	105,7	105,7
3. Labour remuneration fund**, thousand €	45,36	45,36	45,36	45,36	45,36
Total	521,06	151,06	151,06	151,06	151,06

*- In this category of consumption only the cost of diesel oil and engine wear was determined, including repair and maintenance. Usually it is deemed to be 10% of the total value of the investment.

** - these calculations took into account the mandatory health insurance and payments for mandatory health insurance

Table 3.3. Purchasing the equipment needed to ensure operation of the communal platform

Name and brand of equipment	Unit, piece	Unit price, thousand €	Total price, thousand €
1. Bulldozer, John Deer 650J	1	100	100
2. Excavator, ЭП 2626 E	2	35	70
3. Tractor, MT3 82.1	2	20	40
4. Trailer, ПРП 4	2	5	10
Total	x	x	220

Remark: prices are given for brand new equipment as provided by official dealers.

Table 3.4. Calculations for the operation of the communal platform for 5 years

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Investments, thousand €	370	0	0	0	0
2. Operational costs, thousand €	80	80	80	80	80
3. Material costs, thousand €	105.7	105.7	105.7	105.7	105.7
4. Labour remuneration fund, thousand €	45.36	45.36	45.36	45.36	45.36
5. Income from operational activity, thousand €	240	240	240	240	240
6. Profit (losses) before taxes, thousand €	-361.06	8.94	8.94	8.94	8.94

Table 3.5. Analysis of economic efficiency and profitability

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Return on sales, %	-150.4	3.7	3.7	3.7	3.7
2. Economic profitability, %	-60.1	3.9	3.9	3.9	3.9
3. Return on inputs, %	-75.9	8.5	8.5	8.5	8.5

Republic of Moldova

The analysis shows that the activity for the first year of business is unprofitable (ind.6, tab.3.4). But in the next 4 years, such activity can be profitable and may raise the interest of some investors. In economic terms (ind.1, tab.5) profitability is not high, but it can be increased if the price changes and additional services are provided. This kind of business can be classified as a social activity, organization of waste management in rural areas.

AIII.3.3 Cost Effectiveness Analysis of Applying 50 t/ha of manure with bedding to agricultural soils once per five years technology

Starting with the second year in calculating the costs and income derived from that activity, was taken into account changing costs and commodity price under inflation action, wear etc. Where this technology will be developed as commercial, then the selling price may be increased to recover investments.

Table 3. 6. Cost Benefits Analysis for non-profit activity

Category	Year 1	Year 2	Year 3	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investments, thousand €	370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operational costs, thousand €	231,06	240,3	249,9	259,9	270,3	281,1	292,4	304,1	316,2	328,9	342,0	355,7	369,9	384,7	400,1	416,1
Income from operational activity, thousand €	240	249,6	259,6	270,0	280,8	292,0	303,7	315,8	328,5	341,6	355,3	369,5	384,2	399,6	415,6	432,2
Profit, thousand €	-361,06	9,2976	9,7	10,1	10,5	10,9	11,3	11,8	12,2	12,7	13,2	13,8	14,3	14,9	15,5	16,1

In the example in Table3. 7 were considered that technology deployment within a business. Thus, the selling price will be increased annually by 5% , and the amount of fixed assets depreciation will be calculated annual rate of 10% of the original amount of investments - 370 000 €. From these calculations we conclude that since year 8-th, the activity becomes profitable. In this case, because the amount of losses is not large (in year 2 to 25,300 €), the work can be supported by the fund subsidization of agriculture for the first 7 years.

Tabel3 .7. Cost Benefits Analysis for commercial activity

Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investments, thousand €	370	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Operational costs, thousand €	231,06	240,3	249,9	259,9	270,3	281,1	292,4	304,1	316,2	328,9	342,0	355,7	369,9	384,7	400,1
Income from operational activity, thousand €	240	252	264,6	277,83	291,72	306,30	321,62	337,7	354,58	372,31	390,93	410,48	431,0	452,5	475,18
Profit , thousand €	-361,06	-25,3	-22,3	-19,1	-15,6	-11,8	-7,7	-3,4	1,4	6,4	11,9	17,8	24,1	30,8	38,1

HUMAN HEALTH SECTOR

All.4. Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves health care measure.

All.4.1 Policy Fact Sheet of *Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves health care measure.*

Key:

Minimum requirements	
Recommended/ good to have	
POLICY: Name of Policy	Republic of Moldova National Health Policy, 2007-2021
Name of field:	National health policy (2007), Law No 10 from 03.02.2012 relating to state supervision of public health
Date Effective:	2007
Date Announced:	2007
Date Promulgated:	06.08.2007
Date Ended:	The policy is in force
Unit:	Climate Change
Country:	Republic of Moldova
Year:	2011
Policy Status:	In force
Agency:	Ministry of health, the authorities of municipal and cities' local public administration
Funding:	Local, national and international public funds, as well as any private funding
Further Information:	The Republic of Moldova Law Nr.411 from 28.03.1995 concerning health protection and Nr.10 from 03.02.2009 concerning state public health supervision , Ministry of Health Order No.695 from 13.10.2010 relating primary medical assistance.
Enforcement:	The National Centre of Urgent Medical Assistance was established and a Program of its development was adopted (Government decision Nr.564 from 22.05.2006)
Penalty:	Formally there no penalties were foreseen
Related Policies:	1. National health policy (2007) 2. The Republic of Moldova Law Nr.10 from 03.02.2009 concerning state public health supervision

Republic of Moldova

	2. The Strategy of Health System Development, approved by Government Decision No.1471 from 24.12.2007.
Policy Superseded by:	There is no any possibility to supersede
Policy Supersedes:	It is not relevant
Stated Objective:	Climate change adaptation. Health care
Evaluation:	Any evaluation of the policy do not exist now
Policy Type:	Policy in social field
Policy Target:	Adaptive measures are necessary to adopt due to the fact, that heat waves may affect health and may entail sudden death. Certain inexpensive, timely and sufficient measures prove to be effective to reduce heat stress and its consequences. Such measures are essential in the process of adapting to climate change, first of all for population in urban areas.
URL:	Ministry of health - office@ms.gov.md (tel.-022268818); National Centre of Urgent Medical Assistances - anticamera@urgenta.md (022250704); authorities of local public administration
Legal References:	The Republic of Moldova Law Nr.411 from 28.03.1995 concerning health protection and Law Nr.10 from 03.02.2009 concerning state public health supervision site - http://www.dse.md
Description:	Prolonged exposure to high temperatures is an obvious risk for the homeless people in need, especially from urban area. Heat stress, which develops as a result of prolonged exposure of the body to high temperatures in the environment, is a pathophysiological state which affects health and may entail sudden death. The major aims of proposed measure are to increase access to emergency medical care and social care for most people in need and provide prompt simple and effective rehabilitation services. This will contribute to saving lives and adapting of population to extreme temperatures generated by climate change. Being a short term and inexpensive, this measure is very efficient during critical periods of heat waves. Temporary health posts should to be supplemented by prompt rehabilitation procedures which ensure more efficient adaptation of the body to high temperatures. The local authorities and economic agents and nongovernmental organizations should be the stakeholders involved in implementing of mentioned measures. This measure is essential in the process of adapting to climate change too.

AIII.4.2 Economic- financial analysis of *Provisional posts of emergency care and prompt rehabilitation during critical periods of heat waves* measure supported by policy and regulatory path mentioned in the Report.

Table 4. 1. Initial data for cost benefit analysis

Indicator	Value, €, unit.
1. Number of set up stations	40
2. Price of one tent	650

Republic of Moldova

3. Price of the furniture (2 chairs, foldable bed, table)	100
4. Price of one tonometer, €	50
5. Price of medical instruments, €	50
6. One man-day cost, €	20
7. Number of man-days per month	25
8. Number of nurses per one station	1
9. Period of operation, months	4

Table4.2. Necessary investments

Indicator	Sum, €
1. Total price of tents, €	26000
2. Cost of furniture, €	4000
3. Cost of medical instruments, €	4000
Total investments, €	34000

Table4.3. Operational costs

Indicator	Sum, €
1. Labour retribution	2000
2. Social and health insurance payments	500
Total	2500

Table4. 4. Financial means needed to set up mobile health stations during the heat

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Needed investments, €	34000	6800	6800	6800	6800
2. Labour retribution, €	2500	2500	2500	2500	2500
3. Other contingencies, €	3650	3650	3650	3650	3650
Total	40150	12950	12950	12950	12950

The calculations took into account the installation of 40 provisional posts 8 in Chisinau city, 4 in Belts city, the other 28 will be installed 1-2 per town in some of rural districts. The stations will be placed near agricultural markets. Period of operation of these stations will be 4 months (May, June, July, and August). This analysis has been done to determine the needed investments and expenditures. The benefit of this technology is provision of immediate medical aid and saving lives.

All4.3 Cost effectiveness analysis of Provisional posts of medical emergency care and prompt rehabilitation during critical periods of heat waves.

Republic of Moldova

Cost effectiveness analysis of this technology is directed to a non-profit activity. Quantification they cannot be determined in financial resources. It can be done and / or supported by local or central authorities to prevent blood circulatory system illness of population during heat waves of the year. Based on official statistics on people with circulatory poles, we forecast average number of visits per day to 15 patients. Operating time positions, according to calculations is 4 months (120 days). Number of visits planned for the entire period can reach between 50-70 thousand for the period with high temperatures. It is this indicator shows the benefit of this technology

All.5. Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology.

All.5.1 Policy Fact Sheet for Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology.

Key:

Minimum requirements	
Recommended/ good to have	
POLICY: Name of Policy	The Republic of Moldova Law concerning drinking water
Name of field:	National development strategy
Date Effective:	The policy came into force in 1999 year (the Law concerning drinking water, Nr.272 from 10.02.1999).
Date Announced:	The relevant authority announced the policy in 1999 year.
Date Promulgated:	The legal text was promulgated in 1999 year.
Date Ended:	The policy is in force.
Unit:	Climate Change.
Country:	Republic of Moldova.
Year:	The policy came into force in 1999 year.
Policy Status:	In force.
Agency:	Ministry of environment and the authorities of local public health administration.
Funding:	Local, national, international funds, as well as any private funds.
Further Information:	The Republic of Moldova Law concerning drinking water (Nr.272 from 10.02.1999) and Strategy concerning water and sewerage of Republic of Moldova localities (approved by the Government Decision Nr.662 from 13.06.2007).
Enforcement:	No particular enforcement was undertaken yet.
Penalty:	Formally there no penalties were foreseen.
Related Policies:	1. National Strategy concerning water and sewerage of Republic of Moldova localities (2007); 2. Civil Protection and Emergency Situations (Law Nr.93 from 05.04.2007); site - http://dse/md 3. Republic of Moldova National Health Policy, 2007-2021.
Policy Superseded by:	The policy wasn't superseded.
Policy Supersedes:	Not relevant.
Stated Objective:	Climate change adaptation, Health Care.

Republic of Moldova

Evaluation:	An evaluation of the national policy in water and sewerage wasn't undertaken.
Policy Type:	Policy in social field.
Policy Target:	Adaptive measures are necessary due to the fact that heat waves and lack or scarcity of drinking water may significantly affect people wellbeing and health.
URL:	Republic of Moldova Ministry of Environment, State Ecological Inspection (http://www.inseco.gov.md), Geological and Mineral Resources Agency, "Apele Moldovei" Agency (http://www.apelemoldovei.gov.md) , site - www.mediu.gov.md www.ms.gov.md
Legal References:	Republic of Moldova Law concerning drinking water (Nr.272 from 10.02.1999) and Republic of Moldova Strategy concerning water supply and sewerage (approved by the Government Decision Nr.662 from 13.06.2007).
Description:	In last decades in Republic of Moldova the quality of life and both the incidence and severity of morbid conditions, caused by extreme phenomena of climate change, are becoming more pronounced. They turned into a new problem in the region and the country. Among the worst cases are the heat waves. In country the situation becomes alarming due to the exhaustion of ground water reserves. Both the increase of use and intense evaporation from the surface of the soil in summer, especially during heat waves, depletes these reserves. The Government consider the problem as ardent ones. This is reflected in many Governmental decisions. An effective way to adapt to climate change extreme phenomena could be building of water supply systems in many rural areas. This is a long-term measure, which should be a part of the climate change adaptation and reduction of risks. In the last years this measures is being implemented by building of water supply systems supported by external donors. Nevertheless the population more than 500 rural localities still suffer from lack of access to safe drinking water. The estimated cost of one water supply system built in a village is 750 thousand Euro. Due to budget constraints local public administration authorities can allocate only a part of resources.

AIII.5.2 Economic- financial analysis of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology supported by policy and regulatory path mentioned in the Report.

Table 5.1. Initial data for cost-benefit analysis

Indicator	u.m.
1. Construction of the pumping station and development of the adjacent area, thousand €	23
2. Purchasing and installation of a drinking water reservoir of 150m ³ with adjacent operational elements, thousand €	43
3. Construction of a water supply grid and water pipeline for the household consumers, thousand €	340
4. Mounting and installation of electric lines and transformers, thousand €	20
5. Salary for one man-day of work for the operator at pump station operator , €	12

Republic of Moldova

6. Number of working days per month	25
7. Average number of beneficiaries in the locality, households	1500
8. Average sales price of 1m ³ to households, €	0,6
9. Average monthly consumption of water by one household, m ³	10

Table 5.2. Capital investments needed to build a water pipeline

Indicator	m.u.
1. Construction of a pumping station and development of adjacent area, thousand €	23
2. Purchasing and installation of a drinking water reservoir of 150m ³ with adjacent operational elements, thousand €	43
3. Construction of a water supply grid and water pipeline for the household consumers, thousand €	340
4. Mounting and installation of electric lines and transformers, thousand €	20
Total	426

Table 5.3. Operational costs

1. Annual operator's labour retribution, thousand €	3,6
2. Social and health insurance payments, thousand €	0,9
3. Operational maintenance of the water pipeline during one year, thousand €	34
4. Electricity consumption, thousand €	1
Total	39,5

Table 5.4. Projection of Income earned as a result of selling drinking water supply services

1. Average monthly income earned from provision of water supply services to population, thousand €	9
2. Average annual income earned from provision of water supply services to population, thousand €	108

Table 5.5. Cost-benefit analysis

Indicator	Year I	Year II	Year III	Year IV	Year V
1. Investment, thousand €	426	0	0	0	0
2. Current expenditures, thousand €	39,5	39,5	39,5	39,5	39,5
3. Average annual projected income, thousand €	108	108	108	108	108

Remark: economic efficiency indicators, as well as in « waste» technology, can be analysed in table 5.5.

AIII.5.3 Cost Effectiveness Analysis for of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems technology

This technology is classified as a commercial and become attractive for investors in the field. In these calculations were determined depending on current prices income from marketing services. Over the next years prices change depending on inflation. Also, over 10 years of fixed assets can be recovered from expected revenue account. As shown in the calculations are reviewed every 3 years of service price and operating costs. Forecasting period can be updated depending on the delivery price, cost and price useful.

Table 6. Cost Effectiveness Analysis of of Rural population supply with drinking water of guaranteed quality. Building of local water supply systems.

Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Investments th €	426	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86	46,86
Benefits from operational activities, th €	108,0	118,8	119,88	119,988	131,9868	133,1867	133,3067	146,6373	147,9704	148,1037	162,9141	164,3951	164,5432	180,9975	182,643
Costs, th €	39,5	41,5128	41,61164	43,69222	43,79625	43,80145	45,99153	46,10103	46,1065	48,41183	48,5271	48,53286	50,9595	51,08083	51,0869
Profit, th €	-357,5	30,4	31,4	29,4	41,3	42,5	40,5	53,7	55,0	52,8	67,5	69,0	66,7	83,1	84,7

Annex IV

List of experts (national consultants) contracted under the adaptation component of TNA Project

National consultant	Title, position, institution	Background & Area of expertise
Druta Ala	Leader of Adaptation Team in the TNA Project, Dr. of biology, Chief of Plant Biology Department, State Agrarian University of Moldova	Vulnerability and adaptation to climate change; plant ecophysiology, crop production.
Boincean Boris	Prof., Dr. habilitate in agriculture, Research Institute for Filed Crops "Selectia", Coordinating researcher	Agronomy, selection and seed production; organic agriculture, soil management - integrated soil nutrient management
Cerbari Valerian	Prof., Dr. habilitate in agriculture, Institute of Pedology, Agrochemistry and Soil Protection 'N. Dimo', Head of the Pedology Laboratory	Pedology, agrochemistry and soil management, conservation tillage; sustainable farming systems - agro-forestry
Opopol Nicolae	Acad., Prof., Dr. habilitate in medicine, Head of the Hygiene and Epidemiology Chair of 'N. Testemitanu' University of Medicine and Pharmacy	Medicine; human health adaptation to climate change: thermal stress – reduce heat island effect, air conditioning; vector borne – vaccination programs, sustainable surveillance; water borne - improved water treatment; genetic screening of pathogens, etc.
Baltag Grigore	Chief of Economics, Statistics and Analysis Department, Associate Professor, UASM	Financial analysis of agriculture enterprises Economic European integration, Agriculture policy of European Union.