

1. Appendix

Appendix A: Table 1. Operationalization of Aggregated Women's Empowerment Index

Dimensions	Constructs	Characteristics	Variables	Research Basis and Measures Employed in the Study	Values	References	
Personal/ Micro-Level	Power from within	Opinion on economic independence		Power from within as related to economic independence. Financial freedom is a key indicator of one's level of autonomy. Statements on comparison of how the situation changed over the last 3 years.		(Jejeebhoy 2000)	
			Market price	Increased products' selling prices.		(Jejeebhoy 2000)	
			Inputs	Increased access to high quality inputs at lower prices	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	(Norton 2004)	
			Market security	Increased product purchase stability		(Duguid & Weber 2016)	
			Marketing time dedications	Decreased time spent marketing goods		(Duguid & Weber 2016)	
				Reduction of production costs	Decreased production costs		(Narayan 2002)

Self-efficacy	Time dedication	Women consistently find it harder to dedicate time to cooperative meetings and programs designed to improve professional skills.	(Majurin 2012)
		Statement on comparison of how the situation changed over the last 3 years.	5-point Likert scale, where 1=
		Increased willingness to dedicate time to the cooperatives' meetings.	"strongly disagree", 5 = "strongly agree"
Knowledge	Knowledge about financial and extension support for establishment of cooperatives (from government or NGOs)	A woman's education of the legal system is critical to her ability to use it for her advantage. Similarly, women in cooperatives need access to knowledge about the cooperative's financial services to make informed decisions.	(Lombardini et al. 2019)
		Question on having knowledge of financial and extension support services for the establishment of cooperatives.	Yes/No

Power to	Access to credit	Access to credit	Access to credit is important for encouraging entrepreneurial practices in rural areas. Statement on comparison of how the situation changed over the last 3 years. Improved access to credit	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	(Ferguson & Kepe 2011)
	Access to processing	Access to processing	Cooperatives help rural farmers better access processing of their goods because they help fill a deficiency in the market and use pooled resources to improve the conditions of members. Statement on comparison of how the situation changed over the last 3 years. Better access to process their production	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	(Gava et al. 2021)
	Accessibility of services	Supplier services	The collective action of cooperatives to order input supplies in bulk (and thus, lowering the price for small landowners) gives members power to access more supplier services. However, the scheduling of services is		(Norton 2004; Narayan 2002)

	often done with little consideration to the amount of time female cooperative members must devote to domestic labor and may limit their access to input services.		
	Statement on comparison of how the situation changed over the last 3 years.	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	
	Improved services from input suppliers		
Access to information	A woman's education of the legal system is critical to her ability to use it for her advantage. Similarly, women in cooperatives need access to knowledge about the cooperative's financial services to make informed decisions.		(Lombardini et al. 2019)
	Statement on comparison of how the situation changed over the last 3 years.	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	
	Access to market information	Improved access to market information	

			Increase in information	Improved access to information about good agricultural practices		
		Individual capability		Lecoutere (2017) found women with cooperative access had more agronomical knowledge.		(Lecoutere 2017)
				Statement on comparison of how the situation changed over the last 3 years.		
			Training opportunities	Increased training opportunities		
			Participation opportunities	Increased participation in community	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	
			Benefits	Statement on: cooperatives bring economic and non-economic benefits.		
Relational/ Meso-Level	Power over	Control over assets	Land size	Access to, and control over, resources and assets are crucial to one's ability to make decisions autonomously.	Numeric answers	(Jejeebhoy 2000)
			Land cultivated			
			Processing equipment	Ownership of processing equipment	Yes/No	
		Decision-making	Decision-making	Cooperatives have elements of both individual economic		(Sedik & Lerman 2014)

		and professional choices, as well as those voted on by the group to increase bargaining power. Culture also has an influence on deciding to act as an individual or as a community.	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"
		Statement on the importance of collective decision-making for respondents.	
Economic independence	Increase in income	Access to financial means and autonomy are interconnected.	(Veeran 2000)
		Statement on comparison of how the situation changed over the last 3 years.	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"
		Increased income	
Contribution to household income	Income in household	Women who contributed more to household income gained more control over how finances were spent.	(Lecoutere 2017; Ferguson & Kepe 2011)
		Statement on: my earnings are the main source of household income.	Yes/No
Power to	Power in markets	Bargaining power	Women tend to be key decisionmakers on local (De Janvry et. al. 2002)

		markets and with micro enterprises, while their husbands tend to manage the cash crop income.		
		Statement on comparison of how the situation changed over the last 3 years.	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	
		Increased bargaining power		
Personal autonomy	Autonomy	Although less concretely measured than other empowerment tools, like economic mobility or fair access to the legal system, feelings of autonomy play a role in personal empowerment, and can lead to changes on relational and environmental levels.		(Lombardini et al. 2019; Huis et al. 2017)
		Statement on comparison of how the situation changed over the last 3 years	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"	
		Increased feeling of autonomy and independence		
Power with	Social capital	Women are often pulling from their web of social ties to conduct business with trusted individuals, and		(Po & Hickey 2020)

	women with stronger and larger social networks have a greater influence over decision-making for business and home life.	
No. of Contacts	Question on No. of active contacts with other farmers	Numeric answer
Trust	Statement on higher trust among farmers	
	Statement on comparison of how the situation changed over the last 3 years	5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"
Business contacts	Increased No. of business contacts	
Social contacts	Increased No. of social contacts	
Participation in community	Social capital is an important part of gaining access to loans and sharing industry information.	(Alkire et al. 2013)
Organizational membership	Question on no. of farming organizations respondents are members of	Numeric answer
Active work community	Statement on: I actively work with other farmers.	

			Active member	Statement on: I am an active member of the community.		5-point Likert scale, where 1= "strongly disagree", 5 = "strongly agree"
			Sharing of information	Statement on comparison of how the situation changed over the last 3 years Increased chance to mutually share experiences with other farmers		
Environmental/ Macro-Level	NA	Accessibility within environment		Cooperatives helps farmers better access markets for sale of their goods because they help fill a deficiency in the market and use pooled resources to improve the conditions of members.		(Gava et al. 2021)
			Distance to market	Question on distance from the closest market		
			Extension contacts	Question on the number of external consultations the respondents received in the last year.	Numeric answers	(Meier zu Selhausen 2015)
		Access to extensions	Extension improvement	Extension services continue to be harder for women to access due to their limited time outside of household		(Meier zu Selhausen 2015)

and caretaking activities
coupled with safety
concerns over travelling far
from home.

Statement on comparison of
how the situation changed
over the last 3 years.

Improved extension
services

5-point
Likert scale,
where 1=
"strongly
disagree", 5
= "strongly
agree"

Appendix B: Select Questions Used for the Aggregated Women's Empowerment Index
Q.7. Educational status
Q.16. What is your total land holding (in hectares)?
Q.17. How many of the agricultural land do you cultivate [in hectares]?
Q.20. Do you have your own processing equipment for your produce?
Q.33. Do you agree with the statement that it is important to make all decision about your farm by yourself and not in the group?
Q.91. Do you agree that your income has increased in the last 3 years?
Q.92. Do you agree that you are able to access higher quality inputs at a lower price over the last 3 years?
Q.93. Do you agree that you receive higher price for your main product over the last 3 years?
Q.95. Do you agree that your purchase of products is now secure and stable over the last 3 years?
Q.96. Do you agree that your dedication to marketing and selling is less now compared to 3 years ago?
Q.97. Do you agree that you have reduction in the cost of production in the last 3 years?
Q.98. Do you agree that you have better access to credit and saving services over the last 3 years?
Q.99. Do you agree that you have better access to process your production over the last 3 years?
Q.101. Do you agree that your bargaining power on market has improved over the last 3 years?
Q.102. Do you agree that services you receive from input suppliers have improved over the last 3 years?
Q.103. Do you agree that your access to relevant market information have improved over the last 3 years?
Q.109. Do you agree that your opportunity for further training has increased over the last 3 years?
Q.112. Do you agree that you feel more autonomous and independent now than 3 years ago?
Q.14. Is your salary the main source of money for your household? (Yes, No)
Q.25 What is the distance from your farm to the nearest bigger regional market centre? [km]
Q.26. What is the number of external consultant (private, NGO, government extension) visits received in the last year at your farm?
Q.27. With how many other farmers are you in active contact (number of contacts per year)?
Q.28. How many farmers organizations are you member?

Q.29. Do you agree that you actively work with other farmers in the community?
Q.30. Do you agree that there is a general high trust between the farmers?
Q31 Do you consider yourself as active member in your village, town?
Q.32. Would you be willing to dedicate your time to the meetings in the cooperative?
Q.94. Do you agree that you have more business contacts now than 3 years ago?
Q.104. Do you agree that the services you receive from extension agents have improved over the last 3 years?
Q.107. Do you agree that your social contacts have increased over the last 3 years?
Q.108. Do you agree that your access to information about good agricultural practices has improved over the last 3 years?
Q.110. Do you agree that you have better chance to mutually share experience with other farmers over 3 years ago?
Q.34. Do you agree that the cooperative can bring you economic and non-economic benefits?
Q.35. Have you heard about any financial and extension support for establishment of cooperatives (from government or NGOs)?
Q.111. Do you agree that your opportunity to participate in decision about community development has increased over the last 3 years?