

Research Proposal: Gender Dynamics in Food Systems: Exploring Behavioral Influences and Relational Interactions

Background and motivation

Gender equity in agricultural productivity is crucial for the growth and resilience of agrifood value chains (Agarwal, 2021; Doss et al., 2018; Kilic et al., 2015; Njuki et al., 2011; Quisumbing and Pandolfelli, 2010; Seymour, 2017), indicating the need for more rigorous research on such gender dynamics. Existing research has highlighted women's performances in comparison to the performance of their male counterparts in agrifood value chains with respect to yield and productivity (Aguilar et al., 2015; Ali et al., 2016; Cole et al., 2015; Kassie et al., 2012; Kilic et al., 2015; Muriithi et al., 2018; Oseni et al., 2015; Theis et al., 2018). However, since such explorations are relatively new, there is still need for further investigation not just for deeper understanding of the existing findings but also for revealing unknown aspects of this theme.

There have been some attempts to explain variability in gender-based performance outcomes that indicate gender inequalities (within the household or across the supply chain or in relational dynamics among value chain actors) and behavioral factors (like aspirations) may contribute to such differences (Doss, 2001; Huyer, 2016; Kassie et al., 2012; Kilic et al., 2015; Muriithi et al., 2018; Quisumbing and Maluccio, 2003; Quisumbing and Pandolfelli, 2010; Theis et al., 2018; Udry, 1996). In spite of the importance of behavioral factors motivating such differences, there has been limited research focusing on the same. Given the existing literature, researchers have suggested that these evidences are particularly limited in the context of food value chain operations and their actors (Huyer, 2016; Quisumbing and Pandolfelli, 2010). Addressing this limitation, the **first objective** of this research project is to enrich the existing literature with fresh evidences from Ugandan maize supply chain. Aspirations and expectations explaining performance outcomes, in particular, have been discovered more prominently in developmental research and are expected to be positioned more in upcoming developmental research (Karlan and Appel, 2011). In spite of their importance, their presence is still very limited in agricultural value chain research and have not yet been linked to yield and productivity gaps (Huyer, 2016; Kilic et al., 2015) which is the **second aim** of this project.

Learning from the findings on productivity differences and yield gaps, researchers and policymakers, in many instances, have joined forces to bring forth transformation through gender-responsive approaches. However, this pivotal research misses significant evidence on the role of the inter-relationship (interdependence) between discrimination and aspirations in explaining yield, productivity and other performance indicators (and their gender-based gaps) for male and female value chain actors. This is because the existing limited literature is mostly constrained to the individual roles of discrimination and aspirations within food value chains in explaining gender-based gaps in performance indicators (Huyer, 2016; Kassie et al., 2012; Kilic et al., 2015; Quisumbing and Pandolfelli, 2010).

Approaches to increase yield, improve productivity and boost performance could only be successful if the root factors are targeted. However, the interdependence of discrimination and aspirations makes it difficult to identify the root factor. There are two questions that linger in such situations where one or both can be answered 'yes' : (1) Is discrimination against female supply chain actors an outcome of the aspirations or expectations of these actors? For example, are female farmers not encouraged to have improved seed varieties because they do not aspire for higher yield? Or (2) Are aspirations or expectations an outcome of the discrimination faced by the female supply chain actors? For example, are female farmers not aspiring for higher yields because they are not given improved seed varieties, so they form an expectation based on

the discrimination faced? The interdependency is also characterized by societal norms, value chain relational dynamics or operations and behavioral factors which can vary geographically. Although this puzzle is uncomplicated to understand, it is strenuous to unveil its presence. Henceforth, a lot of transformative policies in agrifood value chains of developing economies with a noticeable engagement of women attempt to address gender-based discrimination or aspirations without investigating which of the above scenarios is most important. Thus, the root origin(s) of the differences or gaps remain unnoticed, resulting in no improvements even with successful policy implementations (Kassie et al., 2012; Kilic et al., 2015; Quisumbing and Pandolfelli, 2010). This project is an initial step towards addressing these gaps through the characterization of the reinforcing natures of discrimination and aspirations. The findings of this project will aid in the development of further research ideas to obtain experimental evidence in this context (a funding proposal for DFG 'Individual Research Grants' will be prepared building on this project). The outlined study promotes the Sustainable Development Goals of gender equality, decent work and economic growth and reducing inequalities.

Data and research plan

This research project will rely on an existing survey dataset focusing on the maize supply chain of Uganda which has not been analyzed (except De et al., 2024) along the gender dimension while providing very unique data to answer puzzles regarding gender yield gaps and gender inequalities in service provision. The surveys (interviews with maize farmers and agro-input dealers) were conducted in 2021 and 2022 by Dr. Caroline Mieke (NOVAAFRICA, Nova University Lisbon), Dr. Bjorn Van Campenhout (IFPRI) and Dr. Robert Sparrow (Wageningen University). Dr. Sparrow is the host supervisor for this project. The data were collected over three waves during the second quarter of 2021 and first and third quarter of 2022. 3500 smallholder maize farmers and 348 agro-input shops in the Busoga region of Uganda have been interviewed during each round with some attrition in the last two waves. The applicant has recently used this dataset to study gender bias in perceptions (De et al., 2024) making her well-versed with the dataset. The uniqueness of the data lies in the dyadic nature of the dataset which means the farmers and the agro-input dealers can be linked with each other based on sales relations. Detailed information on service provision by input dealers is also available. Furthermore, the dataset contains information on behavioral attributes like perceptions and aspirations (yield expectations) from the maize farmers which is novel to the existing literature.

In the venture to investigate the above puzzle, this research project will be divided into two work packages. The first work package focuses on identifying gender-based discrimination faced by maize farmers in the services offered by agro-input dealers in Uganda. The second work package will investigate the factors that explain the gender "realized" yield gap and the gender "expected" yield gap for maize farmers in Uganda and will link this to gender-based discrimination in services. If these work packages reveal gender-based discrimination in service provision by agro-input dealers and find service provision, among other attributes, to be explaining the gender expected yield gap, it can be concluded that such upstream gender-based discrimination can motivate aspirations or expectations of the farmers in relation to their productivity levels. The second work package also holds the possibility to study or test the association between gender-based discrimination and yield expectations. The overall goal is to understand the motivations for gender inequalities, identify the presence of gender-based discrimination and determine the outcomes.

Work package 1: Gender-based discrimination in service provision: Evidence from maize agro-input dealing in Uganda

Background and objectives: The existing literature summarizes learnings about gender-based discrimination faced by farmers downstream in food supply chains (Golla et al., 2011; Huyer, 2016; Kilic et al., 2015; Quisumbing and Doss, 2021). For instance, female farmers receiving lower farmgate prices, not having access to specific marketing channels (Kilic et al., 2015; Tanko et al., 2023), having less opportunities for contract farming (Charles and Andrew, 2001; Machio and Meemken, 2023; Mishra et al., 2020), engaging less in cash crop production (Hill and Vigneri, 2014; Manzanera-Ruiz et al., 2016), having limited access to labor (Quisumbing, 2003; Quisumbing and Pandolfelli, 2010), etc. However, evidence of gender-based discrimination in upstream service provision along the supply chain is limited (Elias et al., 2018; Fischer and Qaim, 2012; Meinzen-Dick et al., 2011). The applicant's recent publications are few of the existing studies that contribute to this literature (De et al., 2024; Van Campenhout and De, 2023), focusing on perceptions about the service providers and not directly on service provision for farmers. This work package is motivated by the learnings from the applicant's mentioned publications.

Existing studies indicate constrained access to good quality maize seeds and improved varieties for female farmers (Doss, 2001; Makate and Mutenje, 2021). This work package will contribute to this literature by highlighting gender-based discrimination faced by farmers in service provision from agro-input dealers, further emphasizing the importance of reliable service provision and partially explaining why even with improved varieties, yields remain low. Furthermore, the work package will also discuss how such discrimination in upstream service provision can shape farmers' aspirations and expectations and impact their productivity and yields. Additionally, the existing literature lacks studies on gender homophily in agrifood value chains. Gender homophily can be defined as preference for the same gender, i.e., female (male) input dealers providing service to female (male) farmers mostly and this is not healthy for the growth of the supply chains. This work package will also attempt to add some evidence to this literature.

Data: Pooled data (over time) from the supply chain surveys will be used which includes several potential indicators for service provision (from agro-input dealers) including feasibility to return the seed and obtain a refund in the case of problems with the seed, credit provisions, receipt of training or suggestions on the usage of improved varieties of seeds, provision of home delivery, other after-sales services, options of various payment methods and possibility to buy smaller quantities of seeds among others. The unique dyadic nature of the farmer-dealer links will be exploited (one farmer can receive services from various dealers and one dealer can provide services to various male and female farmers).

Methods: In order to identify discrimination in service provision based on gender of farmers, the following two statistical methods could be suitable: (1) Comparing averages of the services received by female and male farmers using OLS regression on farmer-level averages (because of the dyadic nature) while controlling for farmer-level characteristics with standard errors clustered at the dealer level; (2) Dealer-level fixed effects model to remove all dealer level heterogeneity while controlling for farmer level characteristics with standard errors clustered at the farmer level. A convenient robustness check can be controlling for the services reported by the agro-input dealers themselves. Furthermore, gender homophily could be evaluated by adding an interaction term for the gender of the agro-input dealer. The results from this research could motivate policies for correction of gender-based discrimination in service provision to help form better and equal aspirations and expectations of both female and male farmers.

Work package 2: Explaining gendered realized and expected yield gap of maize farmers in Uganda

Background and objectives: Recent studies have emphasized how gender productivity and gender yield gaps are alarming, resulting in gender inclusivity failures and slow growth of agrifood value chains in developing countries (Abdisa et al, 2024; Aguilar, 2015; Joe-Nkamuke et al., 2019). Existing research on gender yield gap have revealed many crucial learnings for the agrifood sector (Burke and Jayne, 2021; Nchanji et al., 2020). However, the role of aspirations and expectations in yield gaps remain understudied (Bernard et al., 2015; Laajaj and Macours, 2021). Moreover, agricultural research overlooks the importance of gendered expected productivity gaps (Field et al., 2021; Slavchevska et al., 2016) which can have pronounced effects on the actual productivity or yield in the long run. The first objective of this work package is to unpack the role of expectations in gender yield gaps. While the first work package intends to investigate gender-based discrimination in service provision, the second aim of this work package is to build on the findings from the first study and determine the elements influencing yield and expected yield gaps, thus, understanding if discrimination, among other attributes, can motivate expectations about yield and realized yield differently for male and female maize farmers.

Data: Interviews of maize farmers will be analyzed for this work package. The existing literature misses studies using quantitative information about expectations. This dataset fills in this gap with expectations information from maize farmers. The following variables from the dataset indicate expectations with respect to yield: (1) Number of bags of maize a farmer expects to harvest from a certain plot in the next season; (2) If the farmer harvested as much maize from a certain plot as expected in the previous season.

Methods: While exploring what drives aspirations and expectations, this study will delve into understanding if there are significant differences between the reasons female and male farmers consider for harvests not meeting their expectations using the last two survey waves as the first wave misses these details. A potential methodology for this analysis on pooled data would be a probit regression model containing a dummy variable for survey rounds. In order to clarify the hypotheses made, a possible simple statistical method can be T-tests to investigate the following: (1) Are female farmers' yields significantly different from male farmers' yields?; (2) Are female farmers' yield expectations significantly different from male farmers' yield expectations?; (3) Are realized yields and expected yields significantly different?; (4) Is the difference between realized and expected yield significantly different for male and female farmers?

Recognizing which factors explain gender yield gap and gender expected yield gap are crucial for this work package. The work package will attempt to identify how much of these gaps are explained by factors like adoption of improved seed varieties, inputs and practices adopted by the farmers like weeding, usage of pesticides, urea, etc., farmer characteristics like age, education and others. Following methods can address these goals: (1) Season and farmer level fixed effects regressions; (2) Oaxaca-Blinder decomposition for panel data (multiple rounds) with the factors modelled as endowments. This is a widely used methodology for studying gendered gaps (Joe-Nkamuke et al., 2019; Van den Broeck et al., 2023). However, this methodology maybe subject to selection bias which could probably be corrected with Heckman model as the literature suggests (Kim, 2020; Koral and Mercan, 2021). An idea for robustness check is the incorporation of recentered influence functions as observed in recent studies (Firpo et al., 2018).

The outcomes of this work package will aid in the understanding of the drivers of gendered gap in expectations and aspirations and could also potentially suggest if gender-based discrimination motivates such aspirations. By determining the gender expected yield gap and its drivers, this work package makes a

significant contribution to the literature by filling in the evidence-based gap in this context. The study has high potential for addressing relevant policies concerning gender-based agricultural productivity gaps.

Outcomes

The methodologies proposed above are subject to further literature review and exploration of the data. Thus, the expected results are subject to change too. While the applicant has prior research experience on gender-based perceptions of supply chain actors, this project will deepen her understanding of the interplay between discrimination and aspirations bringing in a new research focus, further shaping her expertise in gender dynamics within agrifood value chains. Planned outcomes by the end of the project: (1) 1 scientific article under review with an international peer-reviewed journal, 1 draft version of a scientific article; (2) 1 research blog submitted to IFPRI; (3) 2 internal seminars at DEC (Wageningen University); (4) DFG funding proposal (see below).

Limitations and future research

This research project is the first step towards unveiling the interdependence of gender-based discrimination and aspirations and their role in explaining yield gaps or observed differences in the performance indicators of male and female value chain actors, i.e., obtaining an understanding of the behavioral factors that play a role in productivity gaps. The goal is to fill the evidence-based gap in existing literature. However, the aim cannot be limited to this proposal's timeline as further research would be required for experimental evidence. The proposed research will aid in the preparation of a funding proposal for DFG 'Individual Research Grants' which will include lab-in-the-field experiments involving supply chain actors. The ambition would be to obtain causal directions while measuring aspirations more explicitly and experimentally (Beaman et al., 2012; Bursztyn et al., 2020; Giné and Mansuri, 2018; Jakiela and Ozier, 2016). Essentially, the planned investigations are expected to better prepare and support the proposal for DFG funding in collaboration with Prof. Dr. Liesbeth Colen (University of Göttingen). The applicant plans to simultaneously structure the proposal and research ideas while progressing with this project and develop it further (if necessary) after returning to Germany. Furthermore, the applicant will continue working on the draft version of the second article to prepare the same for submission to a peer-reviewed journal following return to Germany.

Suitability of the Development Economics Group at Wageningen University

The research group is well equipped to support this research project in terms of expertise, research environment, research interests and other practicalities. Associate professor, Dr. Robert Sparrow, has expert knowledge of Ugandan maize supply chains and was involved in the collection of the data proposed to be analyzed. Some of his recent work on the maize supply chain of Uganda include Mieke et al. (2023^a) and Mieke et al. (2023^b). Dr. Sparrow will act as the main supervisor at WUR. Associate professor, Dr. Marrit van den Berg, has been working extensively on women empowerment (Lecoutere et al., 2023; Ntakyo and Van Den Berg, 2022) in recent years and her expertise as co-supervisor will be beneficial for this project. During the course of her PhD, the applicant had visited the Development Economics Group for a research stay in early 2024. Based on overlapping research interests, the applicant had the opportunity to discuss about potential postdoctoral research topics with Dr. Sparrow and Dr. van den Berg. With promising collaborations in sight, this proposal was thus, then developed with active discussions between the mentors and the applicant. During her PhD, the applicant has not been based in groups with specific focus on gender related research. Working closely with Dr. van den Berg will give her wider exposure to approaches and methodological advancements specific to gender studies. Moreover, DEC provides the opportunity for a broader exposure to other areas of development economics which has been lacking in the candidate's doctoral journey.

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