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## Field Testing a Conceptual Framework for Innovation Platform Impact Assessment: The Case of MilkIT Dairy Platforms in Tanga Region, Tanzania

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### ABSTRACT

This article studies the impact of innovation platforms in Tanga Region, Tanzania, set up by the MilkIT dairy development project to intensify smallholder production through feed enhancement and value chain approaches. The conceptual framework used builds up from three socio-economic theories. The Structure-Conduct-Performance model of markets contributes its elegant assumption, linking the way markets are organized with how market actors behave, which has an influence on market performance. The framework is transposed to study innovation platforms, which can be envisaged as market-enhancing institutions, according to New Institutional Economics, the second theory also contributing notions of transaction costs to the framework. The final theoretical contribution comes from business relationship marketing with its field-tested constructs for supply chain performance. This new conceptual framework applied to innovation platforms posits that the structure of the platform (how it is organized) has an impact on its members' conduct (how they communicate and share information), which in turn influences platform performance targeted by members (feed availability and accessibility). Empirical data were collected from stakeholders involved in the MilkIT platforms through focus group discussions, key informant interviews and a survey of 121 farmers. Data were analysed using principal components factor analysis followed by regression analysis. This study finds positive links between frequency, quality and modes of communication by livestock keepers with their perception of satisfactory feed availability and accessibility. On the other hand, results for members and non-members of the platform are not statistically significantly different, probably due to the very early stage of platform development.

### KEYWORDS

Communication; feeds; livestock; value chain

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## Introduction

An innovation platform is “a group of individuals (who often represent organizations) with different backgrounds and interests: farmers, traders, food processors, researchers, government officials etc. The members come together to diagnose problems, identify opportunities and find ways to achieve their goals” (Victor *et al.*, 2013). These system-oriented approaches for stimulating technical, institutional and organizational innovations in agricultural value chains took shape in the 2000s (Nederlof and Pyburn, 2012). They have since been widely recognized by multiple programmes as a tool to establish connections and networks among value chain stakeholders. These enhanced interactions in turn encourage innovative changes via concerted collaboration in addressing common bottlenecks and co-creating solutions.

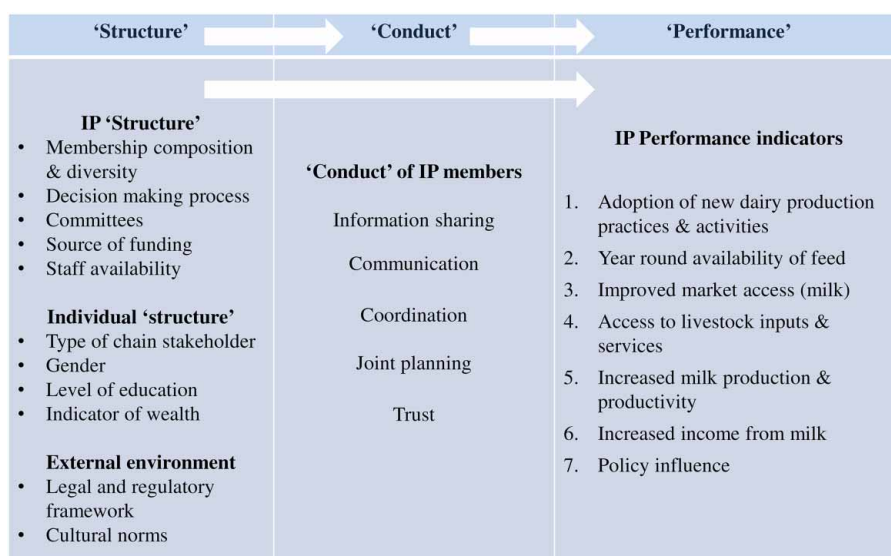
As innovation platforms are increasingly utilized, the importance of evaluating their impacts has also become a major concern of both researchers and development practitioners. Cadilhon (2013) developed a conceptual framework to address the impact assessment of innovation platforms using quantitative research methods and proposed a field method for its empirical validation. The framework is based on three strands of literature: the Structure-Conduct-Performance model, New Institutional Economics, and Supply Chain Management and marketing. Zewdie *et al.* (2013) conducted research following the method proposed to assess the impacts of Volta Basin Integrated Crop-Livestock platforms in Ghana. They could not come to a strong conclusion about the power and appropriateness of the conceptual framework regarding impact evaluation for the Volta Basin platforms. The authors identified certain limitations that might undermine the econometric results used to test the framework: small number of observations, young age of the platforms and lack of a control group. They suggested the framework be appraised through further empirical validations before coming to a reliable conclusion regarding its effectiveness.

This paper attempts a field validation of Cadilhon’s (2013) conceptual framework, based on data collected from two MilkIT project dairy platforms at village level in Tanzania. The MilkIT project “Enhancing dairy-based livelihoods through feed innovation and value chain development approaches” aims to improve availability and reduce seasonality of dairy feed in villages in the Morogoro and Tanga regions using institutional and technical interventions through innovation platforms. Innovation platforms have been established in a total of eight selected villages in the two regions during 2013 (Pham *et al.*, 2014).

## Materials and methods

The conceptual framework developed by Cadilhon (2013) is one of the first systematic models aimed at evaluating the impact of agrifood innovation platforms through a mixed approach of qualitative and econometric analysis. Figure 1 illustrates this framework with performance indicators adapted to the context of MilkIT project platforms in Tanzania.

Due to time limitations, Communication and Feed Availability were selected as focus indicators of Conduct and Performance constructs, respectively, for further analysis. The choice of communication as a conduct focus element was based on previous literature



**Figure 1.** Illustration of different Structure, Conduct and Performance elements (Cadilhon, 2013) adapted to MilkIT Tanzania platforms

acknowledging communication within innovation platforms as an essential facilitator of innovation processes (Victor *et al.*, 2013). The choice of feed availability as a focus for performance indicators came from the realization that feed was one of the major perceived constraints to milk production in the study area (Pham *et al.*, 2014), reflecting also the emphasis of the MilkIT project.

The data used for econometrically testing the framework were collected via 121 semi-structured interviews with questionnaires on Structure, Conduct and Performance information. Both the control and treatment samples were taken from the population of dairy livestock keepers in Mbuzii village, Lushoto District, and Sindeni village, Handeni District, in Tanga region, Tanzania. Treatment groups were platform members, defined by their attending at least one platform meeting. They included 31 platform members in Mbuzii and 28 members in Sindeni. Control groups were 30 and 32 dairy livestock keepers living in Mbuzii and Sindeni, respectively; they had never attended any platform meeting. Due to the early stage and the composition of the platforms, all respondents were livestock keepers and hardly any of them played other roles in the studied value chains. During the two months of data collection in the field from December 2013 to February 2014, two focus group discussions were organized with about 10 platform members each in both villages. Together with multiple informal interviews with key informants, they provided qualitative information that helped in constructing the final analytical models and supporting the econometrical results.

The methods used for questionnaire design and data analysis were identical to those described by Zewdie *et al.* (2013): quantitative data collected from individual farmers were analysed using principal components factor analysis followed by regression analysis. In this paper, the relationships between Structure and Conduct will not be examined and

discussed. The two models constructed to study the relationships between Conduct and Performance of MilkIT innovation platforms in Tanzania are defined as:

$$F_{avai} = \beta_0 + \beta_1 \text{divorced} + \beta_2 \text{widowed} + \beta_3 \text{edu1} + \beta_4 \text{Lncattleperacre} + \beta_5 \text{store} \\ + \beta_6 \text{Comqf} + \beta_7 \text{source1} + \beta_8 \text{source2} + \beta_9 \text{source3}$$

$$F_{acce} = \beta_0 + \beta_1 \text{divorced} + \beta_2 \text{widowed} + \beta_3 \text{share} + \beta_4 \text{Lncattle} + \beta_5 \text{training} \\ + \beta_6 \text{Comqf} + \beta_7 \text{source1} + \beta_8 \text{source2} + \beta_9 \text{source3}$$

$F_{avai}$  is a result of the factor analysis on performance indicators and represents Feed Availability during the dry season.  $F_{acce}$  is another performance factor which can be described as Market Access to larger variety and better feeds. *Divorced* and *widowed* are dummy variables with value 1 indicating the respondent is divorced or widowed. Dummy variable *edu1* indicates the respondent has never attended school if its value is 1. Dummy variable *training* indicates the respondent has attended at least a training course in dairy production or dairy feed and feeding. *Store* and *share* are also dummies with value 1 if the respondent stores crop residues for the dry season or the respondent shares production information with others, respectively. *Lncattleperacre* and *Lncattle* are natural logarithms of number of cattle per acre or of total number of cattle owned. *Comqf* is a result from the factor analysis on communication indicators; this factor can be described as the level of quality and frequency in communicating about feed and feeding. *Source1*, *source2*, and *source3* are factors combining different sources of communication and sharing information, indicating the level of exposure to information and interaction with stakeholders.

## Results and Discussion

No statistically significant difference was found between the control and treatment groups in terms of Structure, Conduct and Performance data. This is probably due to the very young age of the platforms (4 months old): they are not yet providing any difference compared with “business as usual”: sharing information and technologies with neighbours and within other types of farmers’ organizations. Table 1 shows that improved quality and frequency of communication in feed and feeding issues enhanced respondents’ perceptions of having enough feed for their cows during the dry season.

Table 2 indicates that increased exposure to certain sources of information had a positive impact on accessing larger variety and better feed inputs.

**Table 1.** Regression results with feed availability during the dry season as the dependent variable.

Dependent variable	Explanatory variables	Beta	t	P> t
Factor 1: Feed availability during dry season	Divorced	0.180	2.488	0.014
	Widowed	0.082	1.073	0.286
	Edu1	-0.183	-2.008	0.047
	Lncattleperacre	-0.267	-3.111	0.002
	Store	0.178	2.239	0.027
	Comqf	0.201	2.398	0.018
	Source1	0.164	1.967	0.052
	Source2	0.169	2.193	0.031
	Source3	-0.087	-1.018	0.311

**Table 2.** Regression results with market access to larger variety and better feeds as the dependent variable.

Dependent variable	Explanatory variables	Beta	t	P> t
Factor 2: Market access to larger variety and better feeds	Divorced	-0.189	-2.387	0.019
	Widowed	0.114	1.419	0.159
	Share	0.204	1.838	0.069
	Lncattle	-0.170	-1.604	0.112
	training	-0.226	-2.468	0.015
	Comqf	0.078	0.826	0.411
	Source1	0.270	2.630	0.010
	Source2	0.195	2.046	0.043
	Source3	0.012	0.121	0.904

Listening to radio had a significant positive impact on both feed availability during the dry season and feed access. Likewise, contacting input traders, extension officers for feed information and communication via paper-based materials like brochures and posters, among other information sources, connected livestock keepers to the market and make inputs for feed more accessible to them. Besides, communication quality and frequency also improve the availability of feed during dry seasons in a statistically significant way.

One apparently surprising relationship is the negative link between attending dairy and feed trainings and access to feed inputs. Information was gathered in Lushoto about a group of poorer livestock keepers who attended some training by some other projects in the past, but few of them have made significant improvement in dairy production. They probably remain more disadvantaged than average and have less access to feed inputs. The observation was more obvious in Handeni where more livestock keepers claimed they attended multiple training courses but hardly any of them agreed that they were applying the skills and knowledge learnt on their farms. The negative sign could probably be explained by the fact that the more disadvantaged farmers were usually selected for such training and at the time of survey, the training had not made a difference to them in terms of feed availability and accessibility. However, explanations for this require further investigation to come to a clear conclusion.

One platform facilitator and research actor claimed that storing grass and crop residues should play an important role in improving feed availability, and this is proved to be true in the model, especially for livestock keepers in Lushoto, where the number of cattle per household remains small. The number of cattle per acre of land negatively affects feed availability in both villages, regardless of the production scales and feeding systems. This is particularly crucial for Maasai people due to the long established tradition of increasing herd size for social status, even if it may not be economically beneficial due to limited land and water.

Field observations indicated that never attending school and being a widowed woman undermined livestock production in general, especially in terms of access to market and feed availability. The regression model backs this finding, only regarding the negative impact of being uneducated on feed availability during dry season. The significant impact of being divorced on the two dependent variables is surprising given that there is only one case in the sample, warranting further analysis.

Considering the fact that the regression models use psychometric measurements to capture behaviours and perceptions, the adjusted *R*-squared of 0.447 and 0.306 for the feed availability model and feed accessibility model, respectively, do capture a significant part of the relationships among Structure, Conduct and Performance, as hypothesized by Cadilhon (2013).

## Conclusions

This research was designed to test a conceptual framework developed by Cadilhon (2013) to evaluate impacts of innovation platforms. The results of econometric models, backed by triangulation with qualitative data, indicate significant impacts of communication frequency and quality, as well as exposure to different sources of information on livestock keepers' perceptions of feed availability and accessibility. Results also point to the significant roles of education, production scale and practices on the two performance indicators studied. These findings confirm that platform facilitators' investments in fostering communication between platform members are worthwhile because this communication has a positive impact on helping platform members reach their stated goals (Victor et al., 2013). Nonetheless, findings also point to individual situations described by the characteristics of members and their production systems still playing a significant role in reaching stated productivity goals. Thus, innovation platform facilitators should also set up mechanisms that allow innovation processes to be compatible with the needs of individual members of the group.

Some of the relationships posited between elements of structure, conduct and performance of innovation platforms in Cadilhon's (2013) conceptual framework are empirically validated by this study. Future research is still needed to improve the framework's testing in other contexts. Number of observations should be increased further to improve the performance of regression models. Questionnaires should be adjusted to reflect better the individuality of platform members and the type of performance indicators selected according to platform objectives. This would help further to collect relevant variables and avoid missing some meaningful factors.

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## Appendix

The underlying research materials for this article can be accessed at <http://data.ilri.org/portal/dataset/milk-it-project-innovation-platforms-monitoring-and-evaluation-studies-2013-2014>