

Networks and small mechanisation entrepreneurship in Ethiopia and Zimbabwe

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Key highlights

- Zimbabwe and Ethiopia economies can only be realistically transformed if MSE in rural areas are supported to become successful entrepreneurs.
- Poor connectivity between small rural mechanisation entrepreneurs and large manufacturers limits rural entrepreneurs exposure to mechanisation opportunities and access to manufactures services and support. Manufacturers target customers are large farming enterprises using 4WD tractors.
- Access to power and the cost of internet access over phones limits access among rural entrepreneurs manufactures and the internet. Strong horizontal networks enabled small mechanisation businesses to offer mechanisation services, rather than using formal advertising.
- Age and culture were key determinants of small mechanisation business structures in Ethiopia and Zimbabwe. The Ethiopian 2WT businesses were mainly run by youth, who (unlike in Zimbabwe) preferred individual business ownership.
- Scaling small mechanisation requires strong networks - vertical collaboration with manufactures and government extension services; and horizontal engagement with entrepreneur support groups and collectives.
- Mechanisation training helped Zimbabwean women to form support networks that helped other women to see the opportunities. However, distance between clients and entrepreneurial networks constrained the growth of 2WT businesses.
- Entrepreneurship networks and support groups must acknowledge cultural practices of rural clients and address business practices, technology, marketing and value add options in addition to supporting and sharing knowledge about conservation farming systems and mechanisation practices.

Abstract

This paper explores the loops in social networks as regards to how they influence referrals and adoption of small tractor mechanization entrepreneurship within Zimbabwe and Ethiopia. 2WD tractors can present productivity improvements and business opportunities— low start-up costs, rapid increases in productivity and creation of new food processing entrepreneurs and aligned businesses.

Understanding networks is important because networks enable entrepreneurs to gain access to a variety of resources such as information and advice. Entrepreneurs can reduce real and perceived risks by networking with well-regarded individuals and organizations. We observed that small mechanization entrepreneurship occurred in clusters. It is enabled or disabled by their access to opportunity structure i.e. environment that small entrepreneurship operates, which includes infrastructure, technology, financial and social institutions, and other factors

such as literacy and motivation. Where there were weak networks there was no mechanisation.

The Farm Mechanization and Conservation Agriculture for Sustainable Intensification (FACASI) Project played three entrepreneurial roles i) facilitation to discover 2WT service opportunities ii) securing of initial resources – including skills and capital (equipment and finance) iii) obtaining legitimacy – linking nascent entrepreneurs to wider networks. Mechanisation entrepreneurs increased their knowledge and reduced real and perceived risks by networking with well-regarded individuals and organizations. Observations of business operations and strong linkages between operators and suppliers resulted in better perceptions of mechanisation and faster growth.

The limited knowledge about pathways to mechanisation from manual and draft animal farming practices is slowing uptake in 2WT Successful mechanisation entrepreneurs require supporting services, which enable them to access new equipment, spare parts and to learn about farming techniques. We conclude that what is critically needed are country- and region-specific business support policies that encourage mechanisation service networks and business entrepreneurs.

Key words: entrepreneurship network, business systems, opportunity structure, small mechanisation

1.0 Introduction

In this paper we explore how entrepreneurship networks are critical for small mechanisation-based business. Small mechanisation entrepreneurship is essential in Zimbabwe and Ethiopia because most farmers cannot own advanced equipment. Entrepreneurship therefore provides the opportunity for an individual farmer or business person to provide tillage, shelling and other services to farmers.

There is <1 tractor per 100 sq km in both Ethiopia and Zimbabwe (Kirui and Braun 2018). About 9% of farmers used some form of field mechanisation in Ethiopia in 2014-15. In Zimbabwe, ≤15% (in some areas as low as 2%) relied on mechanisation for field operations (Chisango and Obi 2006). The Farm Mechanization and Conservation Agriculture for Sustainable Intensification (FACASI) Project (<http://facasi.act-africa.org/>) approach to reverse this low reliance on mechanisation was through small mechanisation entrepreneurship (Baudron *et al.*, 2015; Sims and Kienzle 2017; Kahan *et al.*, 2017). This is because most rural farmers in Africa cannot afford to own mechanised equipment. Through entrepreneurship, the clear majority can have access to hire services – such as tillage, threshing, planting and herbicide spraying. Entrepreneurship is therefore a way to have sustainable mechanisation. Increasing sustainable mechanisation on small farms in Zimbabwe and Ethiopia will reduce drudgery and increase productivity (Baudron *et al.*, 2015; Baudron *et al.*, 2019). Globally, tractors have become essential to increase the efficiency and quality of agricultural tillage, harvesting and processing.

While 4WD tractors have not been successful in some countries (Baudron *et al.*, 2015) the mechanically simpler and less expensive 2WD tractors have provided considerable benefits

for less developed countries in Africa and Asia. Between 2005 and 2014, the average annual growth of agriculture machinery was 2.75% for Ethiopia, and, 1.07% for Zimbabwe. Most of this however was in large scale farms. Over 70% of farms in Zimbabwe and Ethiopia are rural, small scale or smallholders and adoption of 2WD tractors is relatively localised and quite limited.

Two-wheel tractors (2WT) can present productivity improvements and business opportunities— low start-up costs, rapid increases in productivity and creation of new food processing entrepreneurs and aligned businesses.

Entrepreneurship is the interaction of chance, necessity, and purpose. It is generally considered that entrepreneurs are driven by opportunity-seeking behaviours, not simple desire to invest resources or to rebel against institutional norms. Investment in small mechanisation is however disruptive. For it to succeed, there must be strong networks, which have a significant effect on i) two-wheel tractor (2WT) based business and ii) decision to adopt small mechanisation entrepreneurship. In this paper, we significantly focus on institutional networks, consisting of the formal and informal rules and norms. Entrepreneurial networks are contextual, determined by rules and norms. Formal and informal institutional networks include private for-profit, private non-profit, public, associations, culture, and political practice. These are illustrated in the discussion section.

1.1 Functions of, and loops in social networks

A network is the totality of all persons (or actors) connected by certain type of relationship. There are three critical dimensions of social networks: density, reachability and centrality. Density is the extensiveness of ties between persons and is measured by comparing the total number of ties present to the potential number that would occur if everyone in the network were connected to everyone else. Reachability is the presence of a path between two persons, of whatever distance. Persons can be ranked by how many intermediaries a path travels before one person is indirectly linked with another. This is critically important in rural businesses because networks are the main way that farmers get introduced to mechanisation opportunities.

Actors in networks have different roles. Some actors in a rural business system are ‘bridges’ between systems (e.g. farmer to government policies and finance) and are critical for network optimisation (e.g. creating entrepreneurship knowledge and opportunities) whereas other actors build the broader capacity and reach of the network (farmer to farmer information sharing and support) (Woodhead et al., 2000).

Centrality is determined by two factors a) total distance from a focal person to all other persons. This matters in small mechanisation service delivery. b) The total number of all other persons a focal person can reach. This concept is useful in business referrals and access to services. Entrepreneurs with extensive direct ties to different parts of a client and supply network have a business head start. Centrality serves three important functions 1) communication channels between business relations 2) enable brokerage services linking third parties to one another by transferring resources, and 3) if they are successful, they set the pace for other businesses. Centrality enables an entrepreneurship to have network strength.

Networks have high relevance in establishment and maturation of small mechanisation entrepreneurship. Networks play the function of i) motivation ii) opportunity structures, and iii) access to resources.

1.1.1 Motivation

Networks play a role in the emergence and early growth of a venture. There are three entrepreneurial processes in new venture development i) discovery of opportunities ii) securing resources and iii) obtaining legitimacy. These are essential for survival and performance of an entrepreneurship. These processes are influenced by type and strength of networks, and relate to the degree of innovation in entrepreneurial processes (Elfring and Hulsink 2003).

1.1.2 Opportunity structure

Refers to the broad set up i.e. environment, that an entrepreneurship operates. It determines the chance of rewards or goals, and is largely dependent on institutional (rules, organisations, norms) arrangements. In Zimbabwe and Ethiopia, both formal and informal entrepreneurial institutions coexist, with formal networks fairly limited in comparison to most Western countries. Both formal and informal opportunity structures are hugely influenced by political, cultural and economic systems and practices.

Opportunity structures determine who an entrepreneur consults (Greve and Salaff 2003). The level of entrepreneurial networking often differs based on operational level of an entrepreneurship. Entrepreneurial business systems are also shaped by the historical legacies such as education, culture, scale and colonisation (Woodhead et al., 2005, 2010). Opportunity structure explains why enabling environment in Zimbabwe and Ethiopia is a hugely complex challenge than many western countries, due to their ethnicities, colonial past, religions, complex cultural and social traditions.

1.1.3 Access to resources

Understanding networks is important because networks enable entrepreneurs to gain access to a variety of resources such as information and advice and to share knowledge about services. Entrepreneurs reduce real and perceived risks by networking with well-regarded individuals and organizations. Strong linkages result in better perceptions, which leads to access to beneficial resources. Resource networks lead to trust, a critical element that determines capital flows based on reputation rather than legal enforcement. This is a critical element for small mechanisation based MSE. Network trust is extremely critical in creating cost advantages i.e. the avoidance of market or bureaucratic mechanisms (Hoanga and Antoncic 2003). A well networked business that embeds its entrepreneurial commercial transactions with a lender receives lower interest rates on loans. In the first place, entrepreneurs are more likely to get loans and to receive lower interest rates on loans when well networked with key organisations. Entrepreneurs' embeddedness in resource networks has an even higher value in the difficult MSE environments of Ethiopia and Zimbabwe (see also Uzzi 1999). Poor networking with key individuals and organisations is detrimental for rural women entrepreneurs. For instance, in Ghana, evidence suggests that female entrepreneurs had more difficulties in accessing bank financing (Kuada 2009). In Ethiopia, women entrepreneurs' success was directly related to their network linkages. Networks

significantly influenced women's entrepreneurial start-ups even more than sheer access to credit (Hundera 2014). By and large, there is need for official attitudinal change to device innovative formal instruments that support informal institutional structures/ mechanisms to enhance entrepreneurial equity.

1.2 Nature and levels of networks

Fang et al. (2018) illustrate that strong networks of business leaders are a direct and critical ingredient in the success and innovativeness of a business. These networks extend from school, work, leisure and family, different gender, nationality, academic degrees, majors, professional expertise, and global work. Based on Fang et al. (2018), therefore i) a more diverse network gives leaders access to diverse sets of knowledge – novel ideas and willingness to tackle innovative projects. ii) Diverse networks increase a business' ability to acquire broad (incl. international) contacts and find better business opportunities. Networks are costly, though. Besides, the potential for conflict emanating from extensive networks can affect performance. Amid the negative effects, the entrepreneurship world is complex, and there must be meaningful connections including with institutions. Entrepreneurship is the successful outcome of complex interaction of public and private institutional arrangements, that aim to create the business enabling environment.

Beyond entrepreneurship, social networks have been found to be key driver of success. Ansari et al. (2018) show that the long-term impact of networking activities is sustained through changes in network structure over time. It is not the mere number that matters, it is the nature of networking activities that shape entrepreneurial outcomes. Schmitt et al. (2011) found that benefits of well-structured (but not necessarily formal) networks include customer referrals. Referrals work well when the characteristics of the business product are appropriate. This paper illustrates this notion, through evidence of profitability of small mechanisation products.

1.2.1 Private sector and small entrepreneurship

Micro enterprises and private sector partnerships can have a mutually beneficial relationship. According to Boettiger et al. (2018), Africa's relative lack of big companies is a concern for the growth of micro and small enterprises (MSE). Big companies have deeper roots and longer life spans. Big businesses catalyse entrepreneurial ecosystems and foster small-business creation through their supply chains, distribution networks and attraction of huge cash flows. There is much evidence for the role of the private sector in supporting MSE in agriculture. Jenkins et al. (2013) show how SABMiller (of South Africa) works with thousands of MSEs within its value chain. Strengthening entrepreneurial ecosystems means "raising awareness, aligning incentives, and helping to change mindsets and behaviours within the interconnected, interdependent community of stakeholders whose actions affect small enterprises' prospects for growth and success.

1.3 Entrepreneurship related statistics of Ethiopia and Zimbabwe

The importance of MSE in economic development came to light following the success stories of some East Asian and Western European countries such as Singapore, Taiwan, North Korea, Germany and Italy (Tinarwo 2016). MSE is fundamentally critical to economic transformation (Liedhom and Mead 1999; Mudavanhu et al., 2011).

This section (Table 1) presents key background descriptive statistics about Ethiopia and Zimbabwe. The section further defines MSE (Table 2 and 3) and shows level of readiness for MSE (Fig 1, Fig 2, Appendix 1-3); country indicators, such as ease of doing business and infrastructure, that shape the business environment.

Table 01. Country overview, Ethiopia and Zimbabwe

Ethiopia	Zimbabwe	References
Land area 1,100,000 square kilometres	Land area 390,757 kilometres squared	FinMark Trust 2012); Deloitte 2018; Ageba and Amha 2006) (Reserve Bank of Zimbabwe 2013) Population Reference Bureau 2009; United States Department of State 2015.
Population density 110 per Km ²	Population density 33 Km ²	
Median age 18.8 years	Median age 19 years	
Agriculture employment about 80%	Agriculture employment about 65-70%	
Was not colonised	Was colonised until 1980	
Religion = Islam – 34%; Orthodox Christian – 44%; Protestant Christian – 19%	Christian – 84.5% Unique indigenous belief systems – 2% No religion – 13% Islam <1%	
100 million people – second largest population in Africa, and the most populous landlocked nation on earth	17 million people	
83 languages (and ~200 dialects)	16 Languages	
Adult literacy is low about 40%	Adult literacy is low about 40%	
MSE		
MSE comprise 99% of all enterprises	MSEs constitute 50% of the Zimbabwean GDP and 60% of the economy	
MSE comprise 60% of all private employment	MSEs comprise about 75% of the total workforce, and over 70% of Zimbabwe’s revenue database of registered tax payers.	
About 60% of enterprises are agricultural in nature in Ethiopia	Most of the businesses are in rural areas (66%). 39% operate businesses mainly from residential premises 22% operate businesses mainly from their farms	
About 80 % of MSEs are registered	85% of businesses are largely informal, are not registered or licensed, relatively young (40% are in the start-up and 31% are in the growth phase; in total 71% have been in operation for 5 years or less About 57% of MSME owners are financially included	
Policy issues impacting rural MSE		
Inflation is around 8%.	Inflation is estimated around 25%	
GDP 80.56 USD billion (projected 105 USD billion in 2020)	GDP 18.90 USD billion 2018 (projected 22.00 USD billion in 2020)	
Urbanisation = 20%	Urbanisation = 32%	World Bank 2017

There are remarkable connections among agriculture, MSE, employment and rural residency in Ethiopia and Zimbabwe. Table 01 shows agriculture employs more than 70% of total workforce. MSE accounts for 75% of the total workforce. Over 65% of MSEs are in rural areas. Table 01 shows that structurally, Zimbabwe and Ethiopia economies can only be realistically transformed if MSE in rural areas are revolutionised.

1.3.1 Defining small entrepreneurship in Ethiopia and Zimbabwe

The following are official government definitions of MSE in Zimbabwe and Ethiopia (compare with [Tom and Van der 2008](#); [Gentrit and Justina 2015](#)).

Table 02. Definition of MSE in Zimbabwe

Enterprise category	Employees	Annual Turnover	Asset turnover (USD)	Registration status
Small	10-14	50,000 – 500,000	5,000 – 1,000,000	Formally registered
Medium	41-75	1,000,000-2,000,000	1,000,000 – 2,000,000	Formally registered

[Reserve Bank of Zimbabwe 2018](#); [Berhane., et al 2015](#); [ZIMRA 2018](#)

Micro-enterprises are those whose characteristics fall below the category of small enterprises.

Table 03. GFDRE definition of MSEs in Ethiopia

Enterprise category	Sector	Employees	Labour, capital
Micro	Industry	>5	US\$6,000
	Service	>5	US\$3,000
Small	Industry	6-30	US\$90,000
	Service	6-30	US\$90,000

[GFDRE 2011](#)

Small and micro enterprises in both Ethiopia and Ethiopia are subjected to unique taxation and related regulation (Appendix 4-5)

1.3.2 Business environment related to MSE in Ethiopia and Zimbabwe

Ease of doing business is an aggregation of different parameters that define efficiency in business environment in a country. In the Ease of Doing Business Index (e.g. Appendix 1-3), higher rankings mean better regulations for businesses and stronger protections of property rights. Ease of doing business depends on local policies, markets, demographic response to the product/service, prevalent business model, ease of availability of resources, ease of employability of local talent, et cetera. Zimbabwe and Ethiopia are poorly ranked, 155 and 159 out of 190 globally ([World Bank 2018](#)). In terms of 2018 Logistics Performance Index (indicators), Ethiopia and Zimbabwe are ranked 131 and 161 respectively

The business environment is continually evolving in response to technology among other factors. The emergence of E-commerce and digital financial transfers has enabled rural businesses with internet access to ‘shorten the supply chain’ by trading more directly with suppliers and buyers. Ethiopia and Zimbabwe have a median age of 20s. The young entrepreneurs in these countries are therefore well placed to utilise digital resources and to shape how future social networks evolve and operate. Digital technology has many functions in networks, social media on phones facilitates conversations and the sharing of problems and data among stakeholders who have an interest in 2WT. It is also used for GPS tracking and is increasingly a focus and often a determinant of corporate investment. All these digital applications require reliable internet access and a certain level of technology literacy. The low digital reliability is a major barrier to MSE, apart from the sharing and learning options, internet access also enables weather observations, access to global markets and knowledgeable problem solving when mechanical faults occur.

In principle, internet connectivity covers over 70% of both Ethiopia and Zimbabwe. Most mobile networks are internet enabled. However, there is high internet-lessness (Fig 1 and 2 - [World Wide Web Foundation 2016](#)) partly due to power and the cost of internet access over

phones limit access among rural majority. Wireless infrastructure is mostly found among advanced urban businesses, and services and access are often intermittent.

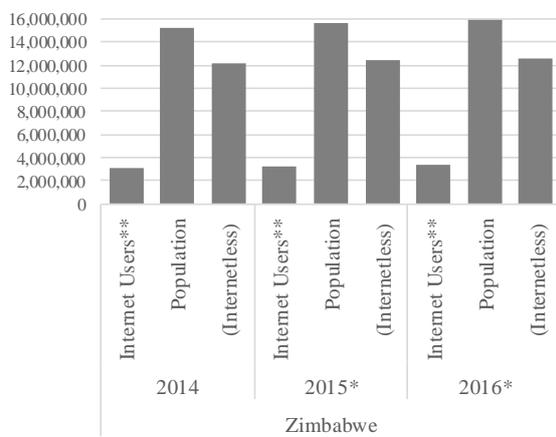


Fig 1. Internet connectivity in Zimbabwe

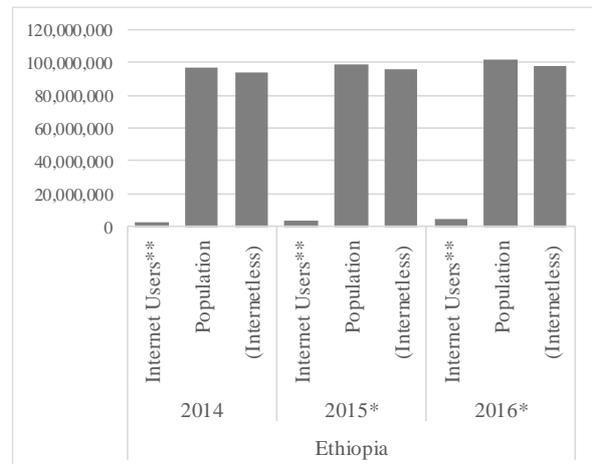


Fig 2. Internet connectivity in Ethiopia

Technology in the form of social media has a pivotal role in supporting social networks or potentially undermining them. Social media is not hindered by geography or social status, but it is limited to infrastructure and the cost of utilisation. Zimbabwe and Ethiopia have relatively low internet access (Fig 1 and Fig 2) and growth in this sector. Zimbabwe is ranked 86 and Ethiopia 79 in the world (with regard to internet access).

1.4 General constraints to entrepreneurial networks

Constraints entrepreneurs face include limited access to, and cost of finance; lack of marketing skills and market knowledge; inadequate management and entrepreneurial skills; lack of access to infrastructure; lack of access to land; lack of information; and, a hostile regulatory environment (Karedza et al., 2014). Other common problems include securing non-financial capital, problems in distribution networks; limited opportunities for promotion and participation; limited amount of government and institutional support; absence of technological know-how and integration mechanism; and rampant corruption in an undisguised or disguised form (Singh and Belwal 2008). Small mechanisation has added constraints, incl. lack of spares or raw materials, government regulation and policies (incl. high capital taxes, bureaucratic burdens, entry regulations), access to capital (i.e. tough collateral requirements, high interest rates) inadequate operational and know-how skills in small mechanisation entrepreneurship. Access to foreign markets and offshore second-hand machinery – instead of high reliance on cheap Chinese 2WT. The growth of small mechanisation entrepreneurship needs access to diverse high quality second-hand spare parts too – like the motor vehicle sector. There is also poor mechanisation enforcement technical standards. Regional harmonisation of mech policies is lacking – entrepreneurs cannot rely on nearby countries for new or used parts, etc.

In this introduction we have established the context for the study drawing on our analysis of secondary documents.

2. Methodology

This paper relies on a combination of methods. Field data were gathered through case research, which are particularly useful in studying small mech entrepreneurship sustainability and institutional arrangements. This study incorporated several data-gathering procedures and tools i) document (secondary) analysis ii) surveys iii) participant and non-participant observation iv) participatory or action research.

Document or secondary analysis served to explore and enable researchers to get a feeling for potentially important small mech entrepreneurship factors. Particularly, to describe entrepreneurship in their appropriate contextual settings of Ethiopia and Zimbabwe, to understand value of networks in entrepreneurship especially existing institutional arrangements, and policy. We have collated secondary data on business environment, networks, micro and small entrepreneurship and institutional environment.

Questionnaire field survey

A total of 28 small mech entrepreneurs were surveyed in FACASI site of Makonde District in Mashonaland West Province of Zimbabwe and Asella District in Oromia Region of Ethiopia. This survey relied upon a structured questionnaire to collect data on type of 2WT enterprises and networks that influence their businesses. Data were analysed using simple descriptive tabulations. Further data were collected using a set of qualitative tools i) Key Informant Interviews ii) FGD observation.

Participant and non-participant observation

Besides the survey, a further 15 women were purposively sampled for in-depth observation and action research. Case research is not about many cases, but rather the amount/ depth of data that are gathered (Fossey *et al*, 2002). This case research purposively sampled informants who were in entrepreneurship (Bernard, 2000; Fossey *et al*, 2002). We targeted individuals with first hand understanding of 2WT-based business entrepreneurship. Because there were no such entrepreneurs in Ethiopia, all 15 were from Nyanga and Makonde Districts of Zimbabwe.

Key Informant Interviews

Key informants comprised 2 development officers, 2 mechanization field experts, 10 extension officers.

Participatory or action research.

To generalize from case studies, esp. to overcome the limitations of a small number of cases, we chose entrepreneurs with wide characteristics such as ones who owned 2WT, offered more services, belonged in associations, and had employees and operators. We therefore avoided studying small entrepreneurship from a limited perspective.

Analyses

We present and analyse data from different sources systematically. Before conclusions, we show logical inferences from both numeric and qualitative evidence. The different kinds of triangulation integrated are methodologies (different types of research methods as presented above), data (different types of data to explain entrepreneurship), the use of more than one cases.

3.0 Findings and discussions

Nature of small mech entrepreneurship and networks

In both Ethiopia and Zimbabwe, all businesses were between the ages of 1 and 4. They all were established under the FACASI Project. Their main services were ploughing, threshing/shelling, transportation, planting, irrigation, harvesting, and reaping. Their common equipment included 2WT, moulding board, seeder/ planter, water pump, harvester/reaper, thresher, trailer, and disc plough. Survey findings (Table 4) show all enterprises were still below their respective country definition of micro entrepreneurships.

Table 4. Selected averages of mechanisation businesses in Ethiopia (no. 8) and Zimbabwe (no. 20)

Country	Average Distance to supplier (KM)	Average Distance to client (KM)	No. of clients	Average No. of workers	Average Capital (US\$)	Average annual income
Ethiopia	156	8	74	5	8622	1525
Zimbabwe	32	19	22	2	3387	9641

All 2WT based entrepreneurships were rural, agricultural, micro (or below), operated from their farms/family houses, all Zimbabwe businesses were informal – not registered or licensed. All Ethiopia entrepreneurs were registered (due to legal requirement), most were run by young (in the start-up, growth phase). All 2WT based entrepreneurs had been in operation for less than 5 years, were somewhat financially included, and had asset turnover of below US\$5,000 (Table 4).

A common constraint for these nascent entrepreneurships was the relative small base of clients in relation to large distance to these businesses as indicated in Table 4.

Two-wheel tractor (2WT) entrepreneur Reachability

Key informant interviews and focus discussions show high presence of linkages with about 150 clients. These networks were mainly service related. However, the presence of a paths between 2WT entrepreneurships and the broader support networks (Fig 1) was inefficient. The 2WT entrepreneurs scored lowly, in terms of how many intermediaries they had with key networks support organisations. This is typical with micro entrepreneurs – they usually have scant links beyond benefactors and clients. The distance between the 2WT entrepreneurs and key support organisations esp. governments, and suppliers was varied. Focus discussions show the centrality of 2WT entrepreneurs (in the broad entrepreneurial network) was poor – the total number of all other critical focal persons they could reach was growing, but still limited. They will need to have extensive ties to different parts of the entrepreneurial network in order to succeed. Focus group discussions showed they need to diversify ties to more sections to i) communicate better with distant yet critical actors e.g. those in cities with >20,000 people ii) rely on brokerage services e.g. associations to link them with key actors and access resources such as cheap credit and better equipment iii) link with high status individuals, for policy support.

Beyond the local or national levels, Ethiopia and Zimbabwe are internationally integrated. They both belong to the Common Market for Eastern and Southern Africa (COMESA – <https://www.comesa.int>), whose goal includes business reforms for productive

entrepreneurship. Zimbabwe also belongs to SADC. There is a clear link between how the 2WT small businesses will grow and cross-border mobility and globalization. Cross border mobility is especially critical for how these land-locked countries facilitate rural productive entrepreneurial development, given their less supportive institutional environments. There is a direct influence by quality of infrastructure, globalisation and cross-border mobility, trade policies on small mech entrepreneurship. These countries do not manufacture small tractors and most of the allied equipment. Currently, trade links and cost of equipment favour Chinese 2WT. This may be ideal for nascent businesses. However, in the long term those with business networks with Chinese manufactures and exporters must ensure trade arrangements do not only benefit elites but rather foster broader entrepreneurial development.

Centrality

There is a fundamental difference between how 2WT entrepreneurs in Ethiopia and Zimbabwe were networked. Zimbabwe entrepreneurs served a larger area – customers were as far as 80km. This reflects how sparsely Zimbabwe is populated compared to Ethiopia. Key Informant Interviews show the centrality of these 2WT in the general entrepreneurial network was however weak.

Key informants in both countries said there is poor connection between rural small mechanisation entrepreneurs and large manufacturers or suppliers. Large equipment businesses dominate key networks. Large tractor dealers' clientele is hardly poor men, women or youth from rural small-scale sectors. These businesses have low awareness on small mechanisation, like the rest of the farming community.

Motivation

Networks originally organised by FACASI played the most critical role in the emergence and early growth of 2WT in both Ethiopia and Zimbabwe. FACASI played three entrepreneurial roles i) facilitation to discover 2WT service opportunities ii) securing of initial resources and iii) obtaining legitimacy – linking nascent entrepreneurs to wider networks. Beyond these, the success of the 2WT are being influenced by type and strength of networks, beside the degree of innovation in 2WT-based entrepreneurship. This last fact is defining the difference among the 2WT-based entrepreneurs.

Opportunity structure

Small mech entrepreneurs all relied upon exogenous sources of resources to start their businesses (Appendix 6, 7, 8 and 9). These businesses did not have formal advertising mechanisms, but rather relied upon social networks to offer services, get clients, referrals, etc. This included through mobile phones, getting/ staying in touch with customers, suppliers, and generally engaging the opportunity structure.

Beyond these basic networks, the structure of opportunities for rural small mech entrepreneurs is constantly changing in Zimbabwe and Ethiopia due to unstable business environment. In particular, fiscal and monetary practices, political and general policy evolve rapidly and make it difficult for rural small entrepreneurs to benefit from existing instruments. A particular gap is the general deficiency in awareness on policy and other entrepreneurial incentives among rural entrepreneurs. There was a critical gap in both Ethiopian and

Zimbabwean, policy awareness support mechanism for rural small entrepreneurs (Also see [Misiko et al., 2016](#)). There is general lack of awareness and policy knowledge that result in a gap between farmer perception of suitability of business environment for small mech entrepreneurship and existing official policy instruments.

The lack of a policy knowledge service was blamed on weak institutional environment, which needed to be resolved to unlock small mechanisation entrepreneurship.

Access to resources

FACASI project network provided vital start-up resources, and covered for several risks. Commonly reported risks included accidents (personal risks), market risks (incl. demand deep), production risks (incl. climate), financial risks (incl. money availability, inflation), policy risks (sudden changes by governments), political turmoil, and fuel (shortage and price fluctuations). As presented under Appendix 6 and in FGD and Key Informant Interviews, fuel was especially critical. All 2WT entrepreneurs heavily relied upon networks to face these risks. There is a one to one correlation between future success of 2WT entrepreneurs and their embeddedness in resource networks. This was seen as the single most critical element entrepreneurs will need to succeed, especially given the difficult MSE environments of Ethiopia and Zimbabwe (see also [Uzzi 1999](#)).

Case research in Zimbabwe show social networks were more critical for women entrepreneurs. Family, links to trusted repair and operator workers, formal creditors, and trusted supporters in general counted for every success. Female entrepreneurs had more difficulties in accessing bank financing, and compensated this by leveraging strong social networks to access capital. Both Zimbabwe and Ethiopia have low salary levels, and low rates of formal employment. This is compounding, because a regular payslip is critical for getting credit and other capital services. Networks were therefore a critical collateral for credit.

Two-wheel tractor-based structure of business

The 2WT business structures in Ethiopia and Zimbabwe were determined by age and culture of entrepreneurs. The Ethiopia 2WT businesses were mainly run by youth, who (unlike in Zimbabwe) preferred individual business ownership. Like women entrepreneurs in Zimbabwe, these nascent businesses are dynamic, but require enhanced linkages or relationships to key components of entrepreneurship. There were only 35 youth groups in Ethiopia focused on agricultural small mechanisation business. Membership of each if these groups is typically not over 15. In Zimbabwe, mechanisation entrepreneurship is associated with large scale farmers, who typically are not young.

Culture, household resource cycle and rural business systems

There is a widely held perception in Ethiopia and Zimbabwe that youth are risky to invest in by lenders and machinery leasing companies. That youths migrate all the time, tend to have temporary residences. Residences are especially critical, including for women. Lack of rights over a house, formal employment income, means one does not have vital collateral. Younger women are at the bottom of this disadvantage, especially if they are expected to marry elsewhere and migrate. These disadvantaged groups were first time buyers of machinery, and did not have meaningful access to credit, unlike returning buyers to often acquired equipment on credit.

The role of training in facilitating beneficial networks

In Zimbabwe, women who were trained eventually formed part of 2WT trainee alumni, formed better entrepreneurship associations. Such associations are critical, especially in Zimbabwe that has poor economic environment, especially poor liquidity, lack of bank guarantees and land tenure inequalities against majority rural poor.

Training helped to build entrepreneurship networks. Training experiences in Zimbabwe and Ethiopia showed consistent preferences among younger men and women. Specifically, women preferred businesses with less requirement for mobility. The few institutes with capacity on 2WT training had not figured how to resolve this. This extended to demand for residential courses, which were not highly preferred among married women. Such courses were more critical.

Key informant interviews (5) in Zimbabwe revealed that a risk taker includes a highly trained entrepreneur, recently laid off by a large company. These entrepreneurs, for instance, resorted to informal fabrication to address gaps in market needs. They mostly operate informally and are networked mainly for skills sharing. Five Key Informants stated that the redeployment of such advanced skills means in the next 10 years, focus will have completely shifted to service-oriented small entrepreneurship, with product customisation for >70% of the market that is smallholder in nature. They argued that large companies have a stake in this, because they are the main losers, when a completely new business culture in Zimbabwe takes root, to replace the fast fading commercial farmer-based concept and networks. Unlike the emerging informal entrepreneurs, respondents explained that large companies have not networked well with small farmers – who are the future market.

Poor coordination of efforts

The scrutiny of networks, especially institutional arrangements showed a general lack of coordination for small mechanisation MSE; different actors (Fig 1) played roles with no clear uniting goal, or policy mandate to bring different institutions along. Networks were mostly private-sector driven, or informal. For instance, the Zimbabwe Agricultural Dealers and Manufacturers Association (ADMA) has no binding policy-guided engagement with government. ADMA was formerly responsible for registering importers, self-regulation, testing and quality control. The Institute of Agric Engineering is not mandated to inherit this role. Notwithstanding, lack of coherence in terms of a central agency has a silver lining. In Zimbabwe, it means importers can now ship in small tractors from different sources with little restraint. There was an emergence of many importers, a form of liberalisation that has resulted in price drops. As presented in findings, however, it is unknown who owns these tractors, or how many there is. The last nationwide data by Zimbabwe Statistics on small tractors was in 2014. There is currently no recent detailed info outside FACASI.

In Ethiopia, the current emphasis on Addis Ababa and its environs is not coordinated, or informed by clear policy. The growth of entrepreneurship in Addis is based on fixed infrastructure attraction (internet access, power and roads), and formal advertising. with the growing youth entrepreneurship, innovation will be more critical beyond mere infrastructure. Key informants, especially the equipment lender and micro-finance companies explained that

when ease of doing business improves, the youth will find alternative arrangements to circumvent some of the current constraints.

Key informant interviews show that scaling small mechanisation requires minimum infrastructural installations, located in the districts, to take full advantage of ICT, solar technology, or fossil fuel. Small mechanisation infrastructure is easy to adapt, to circumvent the current arrangements, where key networks and institutional support are in or closer to Addis Ababa. Or on large farms in Zimbabwe. The emerging mechanisation entrepreneurship scenarios are supported by profitability of the nascent enterprises in Appendix 6 and 7. The culmination of adaptability of rural entrepreneurship is profitability, which will resolve the biggest challenge of small mechanisation; financing.

Conclusions and policy suggestions

Entrepreneurship networks are critical for small mechanisation-based business. Networks enable entrepreneurs to gain access to a variety of resources, and reduce risks. This study shows that small mech entrepreneurs faced numerous risks. To deal with these, they diversified their products. We conclude that diversification requires small mech entrepreneurs to network with several actors. These actors need to be well coordinated to have entrepreneurs access different parts of entrepreneurial networks. A key part of these is policy instruments that address i) facilitation to discover entrepreneurship opportunities ii) access to resources and iii) link start-ups to resource networks, including to large businesses (eg. manufacturers or suppliers). Large businesses have a stake, and can take full advantage to network with smallholders through small mech businesses. Policy is needed to ensure the growth of entrepreneurship in Ethiopia and Zimbabwe is not merely driven by fixed infrastructure, but rather on innovation and ease of doing business. Facilitating innovation is key for entrepreneurs to create alternative arrangements to circumvent some of the current constraints. For instance, to take full advantage of ICT, solar technology, or even fossil fuel.

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Appendices

Appendix 1. Ease of doing business: FACASI countries compared to other regional countries, and Singapore

Economy	Singapore	Mauritius	Rwanda	Kenya	Zimbabwe	Ethiopia
Africa Rank	-	1	2	3	28	29
Global Rank	2	20	29	61	155	159
Starting a Business	3	21	51	126	176	167
Dealing with Construction Permits	8	15	106	128	176	168
Getting Electricity	16	34	68	75	166	131
Registering Property	21	35	2	122	109	144
Getting Credit	32	60	3	8	85	175
Protecting Minority Investors	7	15	14	11	95	178
Paying Taxes	8	6	35	91	145	130
Trading across Borders	45	69	88	112	157	154
Enforcing Contracts	1	27	78	88	168	60
Resolving Insolvency	27	35	58	57	159	148
GDP: 1963: 2017 US\$ ratio	847m: 824b	*150m:13b	128m: 9b	926m: 75b	1b: 17b	- : 81b

<http://www.doingbusiness.org/en/rankings?region=>

* means unclear. – means no data

Appendix 2. Logistics Performance Index and Its Indicators (2018)

Economy	Mean LPI	Mean LPI	% of highest performer	Customs		Infrastructure		Shipment		Competence		Tracing		Timeline	
	Rank	Score		Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Singapore	5	4.05	96.6	2	4	5	4.14	8	3.72	4	4.08	8	4.05	3	4.34
Kenya	63	2.93	69.9	67	2.66	67	2.68	70	2.86	60	2.88	53	3.11	61	3.35
Rwanda	65	2.9	69.3	64	2.68	76	2.6	47	3.14	69	2.77	73	2.83	64	3.31
Ethiopia	131	2.4	57.2	79	2.54	140	2.13	112	2.54	119	2.39	145	2.24	158	2.49
Zimbabwe	161	2.17	51.8	155	2.01	155	2.01	163	2.13	149	2.2	152	2.19	162	2.45

Appendix 3. Important indicators of the economies of Zimbabwe and Ethiopia, compared to Rwanda (same region in Africa)

Zimbabwe					Ethiopia				Rwanda			
Overview	Last	Reference	Previous	Range	Last	Reference	Previous	Range	Last	Reference	Previous	Range
GDP annual Growth rate (%)	2.9	17-Dec	0.6	-17.2: 22.57	10.2	17-Dec	10.9	-11.1: 13.9	5.8	18-Sep	0.1	-2.2: 13.2
Unemployment rate (%)	5.16	17-Dec	5.18	4.17: 10.8	16.8	15-Dec	17.4	16.8: 26.4	7.7	18-Sep	6.7	1.9: 13.2
Inflation rate (%)	31.01	18-Nov	20.85	-7.5: 31.01	10.4	18-Dec	10.6	-4.1: 64.2	-1	18-Nov	-3.4	-15.8: 28.1
Interest Rate (%)	9.56	18-Sep	9.87	8.86: 16.04	7	18-Nov	7	03:11	5.5	18-Nov	5.5	5.5: 9
Balance of trade (US\$ Million)	-224	18-Sep	-127	-3958: 293	-2806	18-Mar	-3362	-3737: -957	-99.53	18-Sep	-123	-1268: -20.58
Current account (US\$ Million)	-240	17-Dec	-591	-3432: 698	-1436	18-Mar	-2077	-2458: 2008	-622	17-Dec	-1336	-1336: 99.12
Current account to GDP (%)	-5.6	17-Dec	-9.2	-29.8: 1.6	-8.5	17-Dec	-9.9	-12.6: 1.5	-14.1	17-Dec	-16.6	-16.6: 1.8
Government debt to GDP (%)	77.6	17-Dec	77.4	31.4: 148	33.5	17-Dec	34.9	24.7: 41.8	40.2	17-Dec	37.6	19.5: 120
Government budget (% of GDP)	-1.1	16-Dec	-1.7	-7.51: 1.3	-3.3	17-Dec	-1.9	-8.9: 6.6	-4.8	17-Dec	-3.2	-5.3: -0.1
Corporate tax rate (%)	25	18-Dec	25	25:30.9	30	18-Dec	30	30:30:00	30	18-Dec	30	30:35:00

Personal income tax rate (%)	50	18-Dec	50	36.05:51.5	35	18-Dec	35	35:35:00	30	18-Dec	30	30:30:00
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Appendix 4. Unincorporated business and sole traders tax in Ethiopia

Taxable business income (ETB)	Rate	Deduction (ETB)
0 – 7,200	Exempt threshold	0
7,201 – 19,400	10%	720
19,401 – 38,400	15%	1710
38,401 – 63,600	20%	3,630
63,601 – 93,600	25%	6,780
93,601 – 130,800	30%	11,460
Over 130,800	35%	18,000

Ethiopia (1 US\$ = 27 ETB) (GFDRE 2011)

Appendix 5. Income tax – companies and trusts - Zimbabwe

Companies	Rate
Basic rate	25%
AIDs levy – based on tax payable	3%
Rate including AIDS levy	25.75%
Special income tax rates	
Foreign interest and dividends	20%
Pension funds	15%
Export manufacturing companies	15% - 20%
Mining operations – companies and mining trusts (including AIDS levy)	25.75%
Special mining lease operations	15%
Income tax holiday rates	
BOOT*/BOT** arrangement operations:	
- First five years	0%
- After 5 years of operation	15%
Licensed investor in a Special Economic Zone	
- First five years	0%
- After 5 years of operation	15%
Electricity generation projects	
- First five years	0%
- After 5 years of operation	15%
Exporting manufacturing company (see below)*	
*BOOT – build, own, operate, and transfer	
** BOT – build, operate, and transfer	
(Reserve Bank of Zimbabwe 2018)	

Appendix 6. Small mechanisation entrepreneurship descriptions – Ethiopia

Age	Service product	No. workers	Capital US\$	Avg anl. income	Key partner role	Equipment	Subsidised by	Key resources needed	No. of clients	Client radius	Critical cost
>1 year	Ploughing threshing/shelling Transportation	3	528	3,239	Training	2WT Moulding board Seeder/ planter Water pump Harvester/reaper Thresher Trailer	None	Training Better 2wT/ 4wT	63	12.0	Spare parts
2 – 4 years	Planting Transportation	0	880	1,510	Training	2WT Seeder/planter Water pump Harvester/reaper Trailer	CIMMYT	Spare parts mechanic	75	5.0	Fuel
1 – 2 years	Planting Irrigation	0	3,292	1,937	Spare parts Training	2WT Moulding board	CIMMYT	Ploughing accessories	150	10.0	Fuel

	Harvesting/reaping Threshing/shelling Transportation					Seeder/planter Water pump Harvester/reaper Thresher Trailer		Modern thresher			
1 – 2 years	Ploughing	2	7,056	127	Training	2WT Disc plough Moulding board Harvester/reaper	iDE	Better 2WT	4	4.0	Fuel
>1 year	Ploughing Harvesting/reaping	15	7,254	246	Training	2WT	None	Finance Trained personnel	200	5.0	Fuel
1 – 2 years	Ploughing Harvesting/reaping Threshing/shelling Transportation	10	21,725	563	Repairs Maintenanc e Training	2WT Harvester/reaper Thresher Trailer	None	Better 2WT Trained personnel	15	6.0	Fuel
1 – 2 years	Ploughing Harvesting/reaping Threshing/shelling Transportation	7	21,197	352	Repairs Maintenanc e Spare parts Training	2WT Disc plough Moulding board Seeder/planter Harvester/reaper Thresher Trailer	GIZ	Water pump Better 2WT or 4WT	17	5.0	Fuel Belt
>7 years	Ploughing Transportation	3	7,042	4,225	Maintenanc e Spare parts Training	2WT Disc plough	Geneway Agriculture Plant PLC	Continued collaboratio n and capacity building support	70	15.0	Fuel

Notes:

- All service providers are male
- All entrepreneurs employed machine operators
- Additional services to customers included i) training support ii) agronomic advice iii) financial support/credit iv) market information

Appendix 7 Small mechanisation entrepreneurship descriptions – Ethiopia

Decision to start business	Main suppliers	Distance to supplier	Km to nearest town	Location	Business structure	Main client	Importance of support	Association membership
Freinds	ISFM	385	25.0	Rural	Individual ownership	Other	Low	Yes
	Suppliers/ CIMMYT	325	5.0	Rural	Individual ownership	Market oriented farmers (1-3 ha)	High	Yes
Kebele	CIMMYT	325	5.0	Rural	Individual ownership	Market oriented farmers (1-3 ha)	High	Yes
Kebele	Suppliers/ iDE	5	5.0	Rural	Group ownership	Commercial large farmers	High	No
Grouped by government and iDE	Government	4	4.0	Rural	Youth group ownership	Market oriented farmers (1-3 ha)	High	No
By government	Min of Agri., Government, farmer association, GIZ	13	10.0	Rural	Youth group ownership	Market oriented farmers (1-3 ha)	High	Yes
Awareness Through Woreda Agriculture Office	GIZ	88	13.0	Rural	Group ownership	Market oriented farmers (1-3 ha)	High	No
Through Woreda Agriculture Office	METEC Adama	100	3.0	Urban	Individual ownership	smallholders < 1ha	Medium	No

Notes:

- There are mechanisation workshops that support service providers
- It is common to have family members working in small business
- Entrepreneurs commonly found customers through i) recommendations from other customers ii) government programmes iii) NGO programmes iv) farmer-based organizations v) Family/ friendship ties iv) roadside conversations vii) Non-farming business networks
- Customer needs were commonly identified through discussions with i) farmers ii) project staff iii) extension workers iv) farmer groups v) personal inquiries vii) farmer groups
- New customers were commonly found through i) demonstrations ii) word of mouth iii) group meetings with farmers

Appendix 8. Small mechanisation entrepreneurship descriptions – Zimbabwe

Gender	Decision to begin business	Professional training	Type of service	Business structure	Main clients	Key machinery suppliers	Participation in collective associat	Main motivation	Own a two-wheel tractor	Finding potential customers	Operators
Male	FACASI	Yes	Threshing / shelling	Individual	Medium scale-market oriented farmers between 1-3 ha	FACASI	No		No	Recommendation	NO
Male	FACASI	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	No		No	Returning customer	NO
Female	FACASI	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	Yes	help access services	No	networks	YES
Male	Potential source of income	Yes	Threshing /shelling	Individual	Small scale farmer < 1 ha land	FACASI	Yes	other	No	Returning customer Network Family	YES
Male	FACASI	Yes	Threshing / shelling	Group ownership	Small scale farmer < 1 ha land	FACASI	Yes	Setting price	No	Returning customer Network Family	NO
Male	Family Business	No	Ploughing Threshing / shelling Transportation	Individual	Small scale farmer < 1 ha land	Other	No		No	Returning customer Recommendation Farmer based organisations	YES
Female	FACASI	Yes	Planting	Individual	Small scale farmer between 1-3 ha	FACASI	No		Yes	Other	YES
Female	FACASI	Yes	Planting Transportation	Group ownership	Large scale farmer	FACASI	Yes	help access services	Yes	Network	YES
Male	Potential source of income	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI Other	No		No	Returning customer Recommendation Family Friends	YES
Male	Potential source of income	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	Yes	Setting price	No	Family/ Friends	NO
Male	FACASI	Yes	Planting Threshing / shelling Transportation	Group ownership	Medium scale-farmers between 1-3 ha	FACASI	No		Yes	Recommendation from another customer Other	NO
Male	Potential source of income	Yes	Threshing / shelling	Group ownership	Small scale farmer < 1 ha land	FACASI	No		No	Other	YES
Male	Potential source of income	Yes	Threshing / shelling	Individual	Large scale farmer	Other	Yes	other	No	Returning customer Recommendation	YES
Male	FACASI	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	Yes	Setting price	No	Returning customer	NO
Male	Potential source of income	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	Yes	Setting price	No	Government Family Networks	NO
Male	Decided to own one since hiring sheller was expensive	Yes	Threshing / shelling	Individual	Medium scale farmers between 1-3 ha	FACASI Agritex	Yes	other	No	Returning customer Recommendation	YES

Male	Potential source of income	Yes	Threshing / shelling	Individual	Medium scale farmers between 1-3 ha	FACASI	No		Yes	Other	YES
Male	FACASI	Yes	Threshing / shelling Transportation Planting	Individual	Small scale farmer < 1 ha land	FACASI	Yes	other	Yes	Government programmes	YES
Male	Potential source of income	Yes	Threshing / shelling Transportation	Individual	Small scale farmer < 1 ha land	FACASI	No		Yes	Other	YES
Male	Potential source of income	Yes	Threshing / shelling	Individual	Small scale farmer < 1 ha land	FACASI	No		Yes	Farmer organisations	YES

Appendix 9. Small mechanisation entrepreneurship descriptions – Zimbabwe

Gender	Time in business	Distance to suppliers (km)	Number of employees	Size of capital	Annual income	Percent contribution to income of hire services	No. of customers	Ha or tons done	Distance to customers (km)
Male	2-4 years	8	1	600	7000	30	18	36 tn	32
Male	2-4 years	5	1	61	2000	5%	5	6 tn	10
Female	2-4 years	40	2	121	500	35	25	32 tn	2
Male	2-4 years	40	1	60	4000	10%	8	15 tn	40
Male	1-2 years	40	1	75	7500	10%	6	10 tn	3
Male	2-4 years	39	1	13000	5000	25%	50	10 tn	17
Female	1-2 years	45	3	6500	60,000	10%	12	35 ha	80
Female	2-4 years	27	3	6500	7000	50%	18	30 tn	2
Male	1-2 years	32	4	1000	5000	60%	40	45 tn	5
Male	1-2 years	60	1	250	3000	4%	3	11 tn	5
Male	1-2 years	25	5	10000	10,000	60%	45	344 tn	40
Male	2-4 years	46	9	1500	7000	10%	3	12 tn	1
Male	<1 year		3	7000	N/A	50%	30	30 tn	10
Male	1-2 years	60	1	89	3900	3%	3	7.2 tn	6
Male	1-2 years	40	1	80	13000	0.01%	4	40 tn	1
Male	2-4 years	78	1	1600	40 000	10%	50	200 tn	50
Male	<1 year	12	1	3000	20000	60%	45	800 tn	36
Male	<1 year	4	1	4000	5000	40%	50	100 tn	8
Male	<1 year	3	2	8500	10 000	50%	5	15 tn	5
Male	<1 year	5	2	3800	\$4000	40%	20	5 tn	24