

**The Role of Linkages in Determining Informal  
And Small Firms' Performance:  
The Case of the Construction Industry in Tanzania**

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**Abstract**

*Despite their significant contribution to employment and to the economy in general, the performance of informal and small construction firms is still low; and has been associated with limited human and working capital, poor technology, limited access to differentiated markets and productive resources. Among the addressed options to overcome these problems is by linking them to relatively large contractors. Empirical studies which have associated the performance of these firms to linkages are unable to show the extent to which linkages explain the performance. While controlling for selected firms' factors, this paper tries to examine the role of linkages in explaining the performance of firms. The results reveal that firms with reliable customers and access to organisational subcontracting arrangements perform better than their counterparts.*

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**Keywords:** employment, informal sector, formal sectors, linkages, small construction

**Introduction**

The role played by informal and small construction firms in the development of housing for the majority of the people in developing countries, and Tanzania in particular, is highly acknowledged. In Tanzania, around 70% of the population live in informal settlements (UN-HABITAT, 2010). The majority of houses in these settlements are built by informal and small construction firms as large firms are not interested in this market (Mlinga & Lema, 2000). As major players in the informal construction sector, they provide the scope for the emergence of local entrepreneurial talent (Sethuraman, 1997). The contribution of the informal construction sector to employment has been growing over time. In 1991, it offered 163,438 jobs, of which 22,327 were in Dar es Salaam (URT, 1991). This grew to 25,240 in 1995 (URT, 1995), and to 26,383 in 2004 (Jason, 2005). The construction sector contributed 5.5% to GDP in 2004; and its GDP per employee grew at an annual rate of 4% during 2001–2006 (World Bank, 2009). These statistics may, however, be understated because they exclude the contribution of

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small and informal construction firms that operate in the informal construction system, whose data are unrecorded and thus hard to gather.

As summarised by Ishengoma and Kappel (2007), the informal sector is among others defined in terms of compliance with government regulations (viz. registration, payment of tax, and adherence to labour regulations), size of firm and the firm-level resource endowment, and applied technology (labour or capital intensive). Given the difficulties in applying some of these terms, empirical studies have been based on the registration of firms by government authorities to describe their informalities. Thus, in Tanzania, an informal construction firm is a firm not registered by the Tanzanian Constructors Registration Board (CRB). This kind of a firm is allowed by CRB to perform a project not exceeding TAS 5m (CRB, 2005). Mlinga and Wells (2002) define small firms as those registered by CRB under Class VI and VII. They also define large firms as those registered by CRB under Class I or II; and medium firms as those under Class III to V. A small firm has also limitation on the value of a project it may undertake as indicated in Table 2.

In line with the observation by Becker (2004) regarding the structure of the informal sector, the majority of construction firms in developing countries are informal and small; they are characterised by limited investments and human capital. The performance of these firms is constrained by limited human and working capital, poor technology, limited access to differentiated markets and productive resources, continuous cancellations of projects from individual clients, unfavourable policies and complex government regulations.<sup>1</sup> Given their important role in supplying services and building houses for the majority of people in developing countries, and the poor in particular, enhancement of their capacity—and thus performance—is imperative for the improvement of quality and reliability of their works.

According to the clusters and linkage literature, the participation of informal construction firms in linkage with the formal ones—which have relatively more capabilities and access to differentiated market, and possibilities of undertaking huge projects—is among the options that can enable them to overcome their challenges and improve their performance. Linkages are transactions between economic agents (Stewart & Ghani, 1991). They can be categorised into active and passive, whereby the former involve linkages with active collaboration; while the latter are not accompanied by any kind of cooperation between transacting parties (Walker & Weber 1984; Anderson & Schmittlein, 1984; Galvin & Morkel, 2001). According to the transaction cost theory, active linkages aim to reduce transaction costs through the enhancement of the capacity of a weaker partner in the

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<sup>1</sup> See Morrisson (1995), Arimah (2001), Kappel, et al. (2004), and Klein 2003 on limited financial services; Yu (2002), Ishengoma (2006) Morrisson (1995) on poor business location and high cost of utilities.

transactions. Linkages between informal or small firms and relatively large firms in the construction sector are prevalent (Arimah, 2001; Mlinga & Walles, 2002). Empirical studies assessing the implication of linkages on the performance of small and informal construction firms are scant, and the few that are available are more exploratory in nature, and cannot show the extent to which linkages explain the performance of firms while controlling for the other factors (viz., firms' human capital, business experience, formality, location and investment in productive assets) (House, 1984; Arimah, 2001; Mlinga & Walles, 2002). They also ignore the possibility of firms involved in active linkages to suffer the consequences of their weakened bargaining power when these linkages are governed by captive (Tokman, 1978) or hierarchy structures (Humphrey & Schmitz, 2000). The global value chain literature (Gereffi, et al. 2003) emphasises the need to consider structures governing linkages when addressing their effect to small producers' performance.

This paper tries to examine the role played by linkages in determining the performance of small and informal contractors to fill up some of the identified gaps. More specifically, the paper aims at offering information on whether contractors involved in active linkages perform better than those involved in passive linkages; and finding out if the structures governing linkages between contractors and their clients have any effect on their performance.

Apart from adding on the body of knowledge, the descriptive analysis of this paper offers information on the profiles of informal and small firms involved in different types of linkages. The study applies regression analysis that controls for selected firms' factors to show if linkages explain informal and small firms' performance. These results are useful in designing policies that aim to promote the involvement of informal and small firms in active linkages as a way of enhancing their performance.

The rest of the paper is organised as follows. Section 2 offers an overview of the construction industry in Tanzania. Section 3 defines major research terms and conceptualises the relationships between linkages and firms' performance, and also provide the hypothesis to be tested. While Section 4 describes the research methodology, Section 5 describes the sample contractors and the profiles of those involved in different types of linkages. Section 6 presents and discusses the empirical findings. Section 7 concludes and offers recommendations.

## **2. An Overview of the Construction Industry in Tanzania**

### ***2.1 The Structure of the Construction Industry***

The structure of the construction industry is presented based on the classification of firms in the industry and size categories. The estimated number of firms in the industry by type of activity undertaken and nationality of ownership are also presented. Based on resources endowment coupled with the value and complexity

of a project<sup>2</sup> which a firm can execute, CRB classifies construction firms into seven classes under five groups of activities: civil works, mechanical, building, electrical and specialist. Mlinga and Wells (2002) further group the seven classes into three size categories of contractors: small (i.e. class VI and VII), medium (class IV and V) and large (class III, II and I), Table 1 summarizes the distribution. This paper follows the definition of Mlinga and Wells (2002).

**Table 1: Registered contractors as of March 2005**

Size	Large				Medium		Small	
	I		II	III	IV	V	VI	VII
Type	Local	Foreign						
Building	27	20	11	9	50	178	164	1097
Civil	10	19	11	16	46	156	299	870
Electrical	7	6	0	2	18	44	29	260
Mechanical	2	6	1	1	4	6	3	27
Temporary	0	33	0	0	0	0	0	0
<b>Sub-total</b>	<b>45</b>	<b>85</b>	<b>23</b>	<b>28</b>	<b>118</b>	<b>384</b>	<b>395</b>	<b>2254</b>
<b>Specialist</b>	<b>Local</b>	<b>Foreign</b>			<b>Local</b>	<b>Foreign</b>	<b>Local</b>	<b>Foreign</b>
	31	21			26	1	209	10
Total by size (N)	76	106						
As percent of total	2.0	2.8						

It is found that small contractors dominate the construction industry in terms of numbers, but their average contribution to output is relatively low. As of March 2005, the industry had 3730 formal construction firms, of which around 70% were small, 14% were medium, and only 6% were large (Table 1). Among contractors registered as Class I, only around 42% were owned by Tanzanians. Most of the Tanzanian contractors were involved in building and specialist projects, but not in civil works, since the latter require a huge resource endowment. Foreign contractors are only 3% of formal contractors. Constructors registered under building dominate the industry; they comprised 42% of formal contractors; those in civil works make up about 35%. With respect to regional distribution, around 44% of the contractors had their main offices in Dar es Salaam.

As per CRB requirements, the classes of registration involve limits on the maximum value of a project a contractor in a particular class may undertake (Table 2). The majority of local contractors have access to small and medium sized projects. In civil works, the kinds of works they do are mainly small rehabilitation and maintenance works, typically less than TAS 500m value.

<sup>2</sup> Resource endowment refers to the amount of physical assets such as equipment and plant, financial ability and level of experience and qualifications of staff maintained by a firm.

**Table 2: Class limits for various types of contractors**

<i>Classes</i>	<b>Class limit for any single contract (in TAS million)</b>				
	<i>Civil</i>	<i>Building</i>	<i>Electrical</i>	<i>Mechanical</i>	<i>Specialist</i>
I	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
II	4,500	1,200	750	750	150
III	1,500	900	450	450	75
IV	750	600	300	300	
V	450	300	150	150	
VII	200	150	75	75	
VII	100	75	30	30	

**Source:** CRB (2005), "List of Registered Contractors, March 2005", Dar es Salaam.

### **3. Definitions and Theoretical Background**

#### **3.1 Linkages**

Linkages are transactions between economic agents, through the market or outside it, fully or partially priced (Stewart & Ghani, 1991). They are non-homogeneous as they involve economic agents with different levels of resource endowments and market powers, and are conducted under different economic environments (e.g., stable or volatile market, homogeneous or heterogeneous customers). Based on the transaction cost approach, clusters and the global value chain literatures, bilateral vertical linkages can be classified into passive vs. active linkages; hierarchy vs. market oriented linkages; and between hierarchy and market oriented linkages (Walker & Weber 1984; Anderson & Schmittlein, 1984; Galvin & Morkel, 2001).

Following the above literature, this paper categorises bilateral vertical linkages into passive and active ones. Passive linkages involve all transactions under arm's-length market relations. With respect to the construction industry, passive linkages are transactions between the construction firms (contractors and suppliers) and individual clients, as majority of these transactions take place in the informal construction system characterised by limited joint action among transacting parties (Mitullah & Wachira, 2003; Mlinga & Wells, 2002, Oforo, 2001).

This paper views active linkages in the construction industry at different stages: (i) transactions between informal/small firms and relatively large contractors, whereby the former are likely to have access to technical and financial support from the latter; and (ii) transactions between small/informal firms and main contractors working for organisational clients, since at this stage, co-operation between main contractors and small/informal ones is likely to be relatively high compared to when small/informal firms are subcontracted by contractors working for individual clients. Active linkages are said to exist if trading parties have been in business relationship for a relatively long time. In this case, the paper incorporates the aspect of small/informal firms having clients that contract them frequently. At another stage, the paper looks at whether these clients are organisational or individual as it is believed that the former are more likely to assist small/informal contractors financially and technically.

Taking into consideration that linkages are different since they are governed by different structures (viz., modular, relational, captive and hierarchy), the paper utilises the attributes that cut across all structures to capture the effect of governance structures. These attributes include the level of investment in relation-specific assets and human capital; the level of involvement of a client in providing product/building specifications to informal/small firms and monitoring/controlling over their operations, offering them training; and the level of a client's equity share in informal/small firms.<sup>3</sup> As documented in literatures, the magnitude of these attributes increase as one move from modular to hierarchy.

### **3.2 Linkages in the construction industry**

#### *3.2.1 Linkages in the informal construction system*

The informal construction system may be viewed as a system that comprises construction activities that are informally undertaken by either formal or informal firms. The system can be categorised into two categories. In the first category, the main contractor, using his own gang with workers having diversified skills, is able to build a whole house (Mwaiselage, 1992). In the second category, contractors possessing specific skills or specialising in certain stages of the construction process undertake jobs limited to their area of speciality. In this category, a client has to hire different contractors for different stages/activities of a project. Contractors may operate in each of the two categories depending on the acquired job, although a majority prefer to operate in the first category. Experienced contractors in the second category can undertake jobs specified for contractors in Class VI and VII. The latter also operate in the informal construction system when they fail to obtain jobs in the formal system, hence the overlap of the boundary between the formal and informal contractors (Mlinga & Wells, 2002).

Contractors in the informal system encounter many shortcomings: operating without productive assets, employing around 2-5 skilled workers and lacking commercial skills (Mlinga & Wells, 2002; Mlinga & Lema, 2000). The construction process stops many times before a house is completed, payments are delayed, materials supplied by individual clients are of low quality, and sometimes delayed (Mlinga & Lema, 2000). These interrupt the working schedule of contractors, and therefore, prolonging the time to complete a house.<sup>4</sup> Thus, the supply of jobs to contractors in the informal system is unsustainable. Furthermore, because of their limited resource endowment, informal and small constructors face difficulties in accessing clients with large projects.

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<sup>3</sup> Based on the collected data from formal and informal firms, the clients do not invest or offer training to the firms they contract or subcontract. Thus, the attributes, viz., the level of investment in relation-specific assets and human capital, provision of training, and a client's investment in subcontracted firms are excluded from the definition.

<sup>4</sup> Among the reasons connected to the stoppage of the construction process is the limited access of funds by individual clients (Mitullah & Wachira, 2003).

*3.2.2 Informal contractors in the formal system through Informal-formal sector linkages*

Informal-formal sector linkages in the construction industry include economic and technological linkages (Mlinga & Wells, 2002). The former involves transactions between formal and informal firms, while the latter entails the transfer of technology and skills between the two categories of firms. According to the value chain literature, the transfer of technology and skills is said to take place if firms have been in business transactions for a relatively long time. Thus, economic and technological linkages are inseparable.

Subcontracting arrangements is widely practised in the construction industry because of the need to minimize labour costs, the requirement of specific skills involved at different stages of the construction process, and due to the complexity of large projects that involve multi-disciplinary expertise. Due to the unpredictable flow of workloads, formal contractors tend to subcontract part of their works to informal firms to avoid idle labour. This enables them to reduce their fixed labour costs, including payment for employment benefits. According to a survey conducted in 1999/2000, around 52 and 48% of a sample of informal firms had worked for large and small contractors, respectively (Mlinga & Lema, 2000). On the other hand, 93 and 82% of large and medium contractors reported that they subcontract works to small formal and informal contractors, respectively. Furthermore, 82% of large and medium firms indicated that they sometimes source materials (i.e., aggregates, timber and timber products, concrete blocks, and pre-cast concrete products) from informal suppliers to supplement their own sources (Mlinga & Wells, 2002).

Linkages between formal and informal/small contractors are said to be beneficial as they enable parties to have access to jobs in the formal construction system and learn from each other (United Nations Centre for Human Settlements (UNCHS), 1991). Some well-established informal firms are said to illegally utilise the trademarks of the formal contractors to access works from the formal construction system.<sup>5</sup> However, informal contractors subcontracted by formal ones are mostly involved in labour only activities, and works that requires low skills (Mlinga & Lema, 2000), a situation that might discourage them to invest in machinery/ equipment and utilise skilled labour.

***3.3 Firm's performance***

The performance of a firm can be measured by its level of turnover, profits, as well as its ability to utilise resources (viz., labour, material inputs and investment in

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<sup>5</sup>This statement was made by some professionals in the construction sector regarding the suspension of the registration of one construction firm which was alleged with the provision of its trade mark to informal contractors.

physical assets) to generate turnover or profits (Ishengoma, 2004; 2006). Furthermore, a firm's performance can also be measured in terms of its growth/dynamics in several spheres, viz., growth in the number of employees, turnover/value added, market share and investment.<sup>6</sup> A definition of a firm's performance based on a firm's dynamics requires a longitudinal study, and may be difficult to adopt in this study because it utilises a cross-sectional study with one year recall. Furthermore, it is usual for construction firms to work on a project for more than a year. The fact that the majority of small and informal firms have limited investment in productive assets and some of them are involved in labour only subcontracting arrangements, it may be difficult to define performance in terms of investment, material inputs or labour productivity. Thus, the study defines a firm's performance as its level of turnover.

### *3.3.1 Linkages and firms' performance: A conceptual framework*

The literature on transaction cost approach argues that hierarchical linkages are appropriate when the transaction cost is high, while passive linkages (i.e., transactions governed by arm's-length market relations) are appropriate when the transaction cost is low.<sup>7</sup> Low transaction cost is related to a perfectly competitive market, whereby products offered are standardised; and hence opportunism, operational and co-ordination costs are low. The involvement of firms in passive linkages increases their economies of scope; raise their capacity utilisation and technical efficiency, sales and profits (Walker & Weber, 1984; Johnston & Lawrence, 1988). On the other hand, hierarchy-governed linkages are related to an imperfect market. Firms may incur major losses if they get involved in an inappropriate market<sup>8</sup>.

The fact that the market has never been perfectly competitive, some scholars address the presence of antagonistic relationship among firms involved in transactions coupled with loose collaboration. In this situation, some firms in a value chain try to weaken others to ensure their own control over profits

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<sup>6</sup> See for example, Nadvi (1999) defines dynamic firms as those experienced growth in sales/profit specificity of investment, loss of resource control and the number of potential suppliers for the product (Walker & Weber, 1984; Monteverde & Teece, 1982; Anderson & Schmittlein, 1984).

<sup>7</sup> Transaction cost as defined by Clemons, et al. (1993), comprises co-ordination cost (i.e. the cost of exchanging information on product – price, characteristics, availability – and demand, cost share of rapid changes in design, cost related to the management of production uncertainties and flexibility), operation risk (i.e. the risk related to shirking behaviour and underperformance of the other parties in the transaction, which may result from the presence of information asymmetries between the parties and difficulties in enforcing agreement) and opportunism risk (i.e. the risk associated with a lack or the loss of bargaining power resulting from relationship-specificity of investment, loss of resource control and the number of potential suppliers for the product) (see also Walker and Weber, 1984; Monteverde and Teece, 1982; Anderson and Schmittlein, 1984).

<sup>8</sup> See Williamson (1983) cited in Walker and Weber (1984), and Johnston and Lawrence (1988).



(Schmitz, 1999; Knorringa, 1999). Moreover, there might be a lack of information sharing, hence limited market knowledge (Johnston & Lawrence, 1988; Walker & Weber, 1984). To overcome market challenges and increase competitiveness, the cluster literature emphasises the role of joint actions (i.e., active linkages) between regular trading partners. The involvement of informal and small firms in active linkages may result into assured market, learning by interaction (Berry et al., 2002; Rabellotti, 1999; Nadvi, 1999), sharing risk, and reduced transaction cost (related to searching cost, reliability in supply, timely delivery and quality).

Following the literature on construction industry, transactions in the informal construction system are related to passive linkages because informal and small firms in this system work for clients who change frequently. These firms are also loosely connected to suppliers of building materials and professionals who offer building drawings, specifications and bills of quantities as client source materials and services from professionals themselves. Lack of direct link between small or informal firms operating in the informal construction system and suppliers of materials or professionals may result into limited knowledge sharing through the provision of constructive feedback. As stated in Section 2, informal or small contractors in the informal construction system have limited access to differentiated markets, financial supports, and organisational advice from professionals in the formal system. On the other hand, informal and small contractors with some kinds of subcontracting arrangements with organisational clients are said to have access to differentiated and assured market as the projects that they perform are long-term in nature. They are also likely to have access to constructive feedback since they are connected to relatively large firms that have high capabilities. They also do not face much delay for their payments. Based on the discussion here, the study hypothesises the following.

*H<sub>1</sub>: Informal and small firms involved in active bilateral linkages are likely to perform better than those involved in passive linkages.*

The global value chain literature argues that the levels of co-operation among firms involved in active linkages are diverse; hence firms involved in these linkages may attain different levels of performance.<sup>9</sup> The diversity of co-operation is, among others, related with different levels of pressure from lead firms and their capabilities. Furthermore, linkages may differ because of diverse structures governing them.

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<sup>9</sup> Cooperation between producers and suppliers or clients is in information exchange, product development, quality improvement, respect of delivery time and payment in advance.

With respect to the levels of pressure and co-operation<sup>10</sup> from lead firms, Knorring (1999) and Scmidtz and Knorringa (1999) argue that if the value chain which producers are involved is quality-driven and dynamic, such producers will get more co-operation from lead firms. They are likely to attain higher levels of performance than price-driven chains. Regarding the capabilities of buyers/lead firms, it is argued that buyers with limited capabilities do not offer technical feedback or support to producers (Nadvi, 1999), and may be unable to stand dramatic market changes, hence producers connected to them may fail to upgrading and perform better (Knorringa, 1999).

Regarding governance structures, the earlier discussion noted that these can be categorised into modular, relational, captive and hierarchical. It is also assumed that labour intensive sectors are governed by buyers (Gereffi, 1994). Given the imperfect market, buyers with relatively more access to differentiated market, marketing information and capabilities (finance, strategic assets, and organisational, marketing and technical knowledge)<sup>11</sup> are likely to have high bargaining power and more leverage to control producers through either captive, or hierarchical governance structure. These structures are characterised by high transaction costs, hence high switching costs. Thus, producers participating in linkages governed by these structures are likely to perform poorly.

According to the CRB registration requirements in Tanzania, medium and large contractors have more capabilities. The registration policy also gives them more autonomy to serve a differentiated market. Therefore, informal and small firms can access differentiated markets through subcontracting arrangements with large firms. Some small and well-established informal contractors with more capabilities are specialised in specific stages of the construction process. These contractors, particularly small ones, work as nominated subcontractors, and thus have relatively more bargaining power. They also have direct access to differentiated markets. They can also come up with their own specifications and do not need to be closely supervised by main contractors. Based on this discussion, it is possible to find the four types of structures (modular, relational, captive and hierarchical) that govern active linkages (i.e. linkages with organisational clients) in the construction industry.

According to the definition of governance structures, it is expected that firms involved in linkages governed by captive or hierarchical governance structures have relatively low capabilities, thus more likely to be given specifications, to be highly supervised/monitored, to have limited direct access to differentiated market, and to have low bargaining power. On the other hand, those involved in modular or

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<sup>10</sup>For example, close follow-up, strict quality control, investing in process and product upgrading (Scmidtz & Knorringa, 1999).

<sup>11</sup>According to Gereffi (1999) strategic assets include tangible (machinery), intangible (bands) and intermediate (marketing skills).

relational linkages are likely to have direct access to differentiated market, to have a large market base, and have relatively more bargaining power, and therefore have high possibilities to perform better than those involved in linkages governed by hierarchy or captive linkages. Thus, the study hypothesises the following:

H<sub>2</sub>: *Informal/small contractors involved in linkages governed by modular/relational linkages are expected to perform better than those involved linkages governed by captive/hierarchical linkages. In other words, a firm's performance increases as one moves from captive/hierarchy to modular/relational linkages.*

#### **4. Methodology**

##### **4.1 Associating poverty reduction to linkages**

Based on the conceptual relationships described above, this paper utilizes a semi-log regression model that expresses a firm's performance as a function of linkages while controlling for a selected firm's specific characteristics.

$$P_i = A + \sum \beta_1 C_i + \sum \beta_2 L_i + e_i \quad (1)$$

Where  $P_i$ ,  $C_i$ ,  $L_i$ , and  $e_i$  stand for a firm's performance, controllable variables, linkages and error term respectively. The  $\beta_1$  and  $\beta_2$  are parameters to be estimated.

To indicate a firm's performance, the study utilizes a firm's turnover measured as average annual turnover (i.e., total turnover from 2003 to 2005 divided by three) realized from the projects it did.

##### *Linkages*

The study utilises two variables to capture linkages. The first one is *passive vs. active linkages*, which is captured by five indicators: *subcontracting arrangements* measured as dummy one if a firm had access to subcontracting arrangements between 2003 and 2005 and zero otherwise; access to *organisational clients* indicated as dummy one if a firm worked for organisational clients during 2003 to 2005 and zero otherwise; and *organisational subcontracting* measured as dummy one for firms that had access to organisational clients through subcontracting arrangements. Others are *reliable clients* measured as dummy one for firms that had reliable clients (i.e., clients that contract them frequently) and zero otherwise; and *reliable organisational clients* measured as dummy one if a firm

was frequently contracted by organisational clients and zero otherwise<sup>12</sup>. The second variable capturing linkage differences due to diverse governance structures is *captive/hierarchy vs. relational/modular (captive-modular)*. The study utilises an index value created from unbalanced (positive skewed) 5 point-scale variables indicating how often a small or informal firm is supplied with product/building specifications; and how often their clients closely supervise them.

#### *Controllable variables*

The controllable variables include a firm's capabilities, viz., employees' education, managers' education, technical skills and experience. Others are location and investment in productive assets. Investment in productive assets is said to have a positive effect on the performance of firms if the assets are more related to the core activities a firm is involved in (Ishengoma, 2006). Though location and investment in productive assets were found to be important variables, what we found from the analysis of our data is that many firms located in Dar es Salaam undertook construction activities in several regions within the country. Furthermore, the majority of small and informal contractors have limited investment in productive assets as they lease equipment (Mlinga & Wells, 2002), and also most of them could not offer their data. With this note, therefore, the variables location dummy and investment dummy are not considered in the regression analysis.

Regarding the relationship between human capital and performance, it has been argued that firms managed by educated managers and utilising educated workers are likely to perform better (Welsh, 1970; Ishengoma, 2006). Business experience is another variable that may influence performance as the workforce may also learn by doing (Malerba, 1992; Page, 1984; Jovanovic, 1982). A firm which has been in business for a long time may have better access to productive resources like loans since their providers attach more risk to new firms than those which have been in business for a relatively long time.

The study captures human capital using three indicators: *managers' education*, measured as the natural logarithm of managers' average years of education; *managers' advanced industrial skills*, measured as dummy one if a firm has at least a manager with advanced skills (i.e., at least a diploma) related to the construction industry. *Experience* is measured as the number of years a firm has operated in the construction industry. This variable is transformed into natural logarithm to reduce diversity.<sup>13</sup>

<sup>12</sup>See Humphrey and Schmitz (2000), Gereffi, 1994, 1999; Kaplinsky, *et al.* (2003), Schmitz and Knorringa (1999).

<sup>13</sup>Capturing linkages, viz., access to subcontracting, organisational clients, organisational sub-contracting arrangements, reliable clients and reliable organisational clients, as their turnovers expressed as proportion to total turnover would have been very useful. However, the study cannot employ this approach

## **4.2 Data**

The paper utilises data from a survey conducted in 2006 to analyse the role played by linkages in determining small and informal firms' performance and poverty reduction in Tanzania. Several issues covered by the survey include contractors' general characteristics, turnover, workers and managers' skills, and educational levels and attributes of governance structures.<sup>14</sup> Using a stratified random sampling, 83 formal contractors—of which 46 were small and the rest were large and medium—were interviewed.

Due to the lack of information on the number of informal contractors and their addresses, respondents were traced at the construction sites for interview. Selection of these contractors considered those in commercial cities and those in individual sites. Sixty three informal contractors were interviewed. This paper focuses on 109 informal and small contractors.<sup>15</sup> Among these, 78 were based in Dar es Salaam and the rest in Arusha and Mwanza.

### *4.2.1 The profile of small and informal contractors*

The majority (74%) of informal contractors were sole proprietors, while most of small (72%) contractors were operating as limited liability companies. The activities in which contractors were involved include carpentry/roofing (42%), followed by masonry/plastering (40%), and then tiling (26%). Very few firms were involved in aluminium works (1 firm), air conditioning (1 firm), steelworks (6 firms), and landscaping (7 firms).

The average numbers of workers with informal contractors were 10; while for small contractors they were 28, of which 22 were regular casuals (Table 3: Panel A). Regarding the education levels and skills of workers in the sample firms, the results (Table 3: Panel B) reveal that most of employees in informal firms had primary-level education. Compared to small firms, the majority of workers in informal firms had no professional skills. These findings corroborate the argument that informal firms train their workers on-the-job, rather than employing workers with formal professional skills (Nelson, 2006).

Table 3: Size of firms and formality by structure of employment, levels of education and presence of professional skills in 2004-05

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#### **Panel A: Size of firms and formality by structure of employment**

because some small/informal firms did not have access subcontracting, organisational clients, organisational sub contracting arrangements, reliable clients and reliable organisational clients.

<sup>14</sup>The regression analysis on contractors excludes workers' skills since majority of them did not respond on it.

<sup>15</sup> The survey involved three sub samples: small manufacturers of building materials, informal and formal contractors and their employees. Thus, three types of structured questionnaires were personally administered. For detailed information, see Ishengoma and Lokina (forthcoming).

<i>Average number of employees (2004-05)</i>				
Formality and size of the firm	Regular casuals	Permanent employees	Total number of employees	Regular casuals as% of total employees
Informal	10	0	10	100.00
Small (Class 6&7)	22	6	28	78.57

**Panel B: Size of firms and formality by levels of education and presence of professional skills in 2004-05**

Formality and size of the firm	Number of employees with primary education only ♦	Employees with secondary education ♦	Employees with professional skills (the number in bracket is the % total workers) ♦	Number of firms with at least 10% of employees with professional skills* ♦	Average managers' education in years ♦	Number of firms with at least a managers with industrial* (construction) skills	Number of firms with at least a managers with advanced industrial* (construction) skills
Informal	7	0	1 (14%)	19	7	35 (61%)	4 (7%)
Small (class 6&7)	21	6	9 (33%)	28	14.6	41 (93%)	39 (89%)

**Notes:** \* Professional and Industrial skills imply skills related to the construction industry. Advanced industrial skills exclude artisan.

♦The reported values are medians.

**Source:** Field data

The average level of education of managers in informal firms is less than half (i.e., 7 years, which is equivalent to primary education) of those in small firms (i.e., around 15 years, which is equivalent to advanced diploma). Although 61% of informal firms had at least a manager with professional skills, only 7% utilised a manager with advanced industrial skills. On the other hand, the majority of small firms—i.e., 93 and 89%—had at least a manager with industrial skills and advanced industrial skills, respectively. Thus, as should be expected, formal contractors seem to utilise relatively more skilled workers and managers because this is among the requirements of a firm to be registered with the CRB.

#### 4.2.3 Firms' access to subcontracting arrangements and organisational clients

The results in Table 4 reveal that around 44 and 38% of informal and small firms had access to subcontracting arrangements. The majority of informal firms (around 72%) reported that they had no clients that contract them frequently. This might be a result of their limited access to organisational clients (Table 4). These results corroborate with the findings by several studies as summarised elsewhere (Ishengom et al 2007). The results on informal firms' limited access to organisational clients contradict with the findings by Mlinga and Wells (2002), which report that at least 80% of medium and large construction companies offered some jobs to informal firms. The contradiction might be related to the way the question was posed to respondents. While this study looks at whether an informal firm did some work for organisational clients, Mlinga and Wells (2002) asked large and medium firms to report on whether they sometimes gave some works to informal firms.

**Table 4: Size of firms and formality by firms' access to subcontracting**

**Arrangements and organisational clients in 2003-05**

<b>Size/ Class</b>	<b>% of firms in each class that had clients who contract them frequently 2003-05</b>	<b>% of firms in each class that had sub- contracting arrangements in 2003-05</b>	<b>% of firms in each class that had access to organisational clients 2003-05</b>	<b>% of number of firms in each class that had access to organisational clients through sub- contracting</b>	<b>Total observation</b>
Informal Small (class 6&7)	27.10%	43.50%	38.70%	30.60%	62
	45.00%	37.80%	90.90%	33.30%	45

Source: Field data

Forty five percent of small firms had clients that contract them frequently and most of them (90%) had access to organisational clients. The results are consistent with the findings by Arimah (2001) that a firm's level of formality increases its possibility to participate in forward active linkages. Although 90% of small firms had access to organisational clients, only 33% accessed these clients through subcontracting arrangements. This might be because small firms operating outside Dar es Salaam have a direct access to organisational clients as areas outside Dar es Salaam have low competition. **In comparison to, Small** contractors seem to have more accessibility to organisational clients than informal contractors. This is in line with the CRB registration requirements, which give the former higher position in terms of the value of projects (i.e. TAS 150m) they can undertake than the latter as the value of projects they are allowed to undertake is only TAS 5m. Tendering of construction works requires that firms subcontracted should be more qualified, and hence be recognised by CRB.

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*4.2.3 Profiles of firms with access to subcontracting arrangements and organisational clients*

As indicated in Table 5, 68% of firms that had access to subcontracting arrangements had at least a manager with industrial skills. However, the average level of education of managers in these firms was slightly lower than that of managers in firms that had no access to subcontracting arrangements. Consistent with the education levels, firms that had no access to subcontracting arrangements attained higher average turnover than their counterparts.

The former were also involved in linkages that were more quality-oriented (index value of 0.78), though they were relatively more governed by their clients. Given these contradicting results, further analysis that considers the final client in subcontracting arrangements was undertaken. As noted in Section 3, main

contractors working for organisational clients are likely to offer higher level co-operation to subcontracted firms than those working for individual clients.

Table 5: Managers' educational levels and skills by firms' involvement in subcontracting arrangements and access to organisational clients

	A firm worked as a sub-contractor		A firm worked for organisational clients		A firm work for organisational client through subcontracting		A firm has major clients that contract frequently		Organisational clients contract frequently	
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
A firm has at least a managers with industrial skills	19.3	31.8	47.2	12.5	26.9	20.6	26.8	20	28.6	12.5
	80.7	68.2	52.8	87.5	73.1	79.4	73.2	80	71.4	87.5
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
	<b>57</b>	<b>44</b>	<b>36</b>	<b>64</b>	<b>67</b>	<b>34</b>	<b>71</b>	<b>30</b>	<b>77</b>	<b>24</b>
Average education of managers in years ♦	12.6	11	7	13	11	11	11	12.5	11	13
Observations (%)	52	43	36	59	62	33	66	29	73	22
Average turnover for 3 yrs (2003-05) (TAS millions) ♦	13.7	6.7	3.3	34.7	8.7	12.0	6.5	36.1	6.0	40.3
Observations (%)	61	43	40	64	70	34	74	30	80	24
Linkage-quality index ♦	0.78	0.75	0.75	0.81	0.812	0.75	0.75	0.84	0.75	0.88
Observations (%)	48	37	25	60	54	31	59	26	63	22
Linkage-price index ♦	0.63	0.63	0.69	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Observations (%)	47	41	27	61	56	32	59	29	64	24
Linkage hierarch-captive--modular ♦	0.75	0.63	0.63	0.75	0.75	0.63	0.63	0.75	0.63	0.75
Observations (%)	53	42	32	63	63	32	65	30	71	24

**Note:** ♦ The reported values are medians.

**Source:** Authors' computations

After considering the final clients, the results reveal that 88% of firms which had access to organisational clients had at least a manager with industrial skills and utilised managers with higher level of education (i.e. 13 years which is equivalent to a diploma) than those which worked for individual clients (Table 5). Firms with access to organisational clients attained 10 times higher average turnover and were involved in linkages that were more quality oriented than their counterparts. Furthermore, the results reveal that a significant percentage of firms that had access to organisational clients through subcontracting arrangements had at least a manager with industrial skills. These firms attained higher turnover than their counterparts.

The majority of firms (i.e., 80%) had at least a manager with industrial skills. Furthermore, these firms utilised relatively more educated managers and attained around seven times higher turnover than their counterparts.



### Linkages and Firms' Performance

The previous section shows the possibility of contractors involved in active linkages to perform better than their counterpart. The former also seem to have more capabilities than their counterparts, which might be the reason why they perform better. This section reports on the multiple regression results which show the effect of linkages on performance, while controlling for firms' capabilities. Table 6 provides the descriptive statistics of the data used in the regression analysis.

Table 6: Descriptive Statistics of Variables used in the Regression Analysis

DESCRIPTIVE		
Variables	Mean-Statistic	Std. Error
Log of average turnover	16,569	0,228
Log of age of the firm	2,211	0,071
Natural log of average education of managers	2,396	0,040
Dummy advanced industrial skills	0,434	0,057
Dummy formality	0,434	0,057
Linkage hierarch-captive--modular	0,668	0,022
Dummy 1 if a firm worked as a subcontractors, 0 otherwise	0,461	0,058
Dummy 1 is a firm sale to organisational client	0,671	0,054
A firm work for organisational client and is subcontracted (interaction)	0,355	0,055
Major client buy from me frequently	0,303	0,053
Sale to organisational clients who buy frequently	0,250	0,050

Table 7 offers the results on the estimated coefficients for each explanatory variable entered in Equation (1). The results for this equation are presented in five models since the indicators (*viz.*, *access to subcontracting arrangements*, *access to organisational clients*, *access to organisational subcontracting arrangements*, *having reliable clients*, and *having reliable organisational clients*) capturing passive vs. active linkages, are entered in the Equation 1 at a time.

Four out of the six variables entered in Models 2 to 5, and only two out of six variables entered in Model 1, seem to significantly explain the performance of sample contractors. The variables entered in these models significantly explain around 61 – 66% of the average turnover attained by sample contractors.

#### *Passive vs. active linkages and contractors' performance*

After controlling for their capabilities, sample contractors involved in subcontracting arrangements seem to attain higher turnover than their counterparts, but the difference between them is insignificant. Thus, being

involved in subcontracting arrangements does not necessarily lead to better performance. It is possible that subcontracted firms may not benefit from joint action if the main contractors who have subcontracted them have low capabilities; and probably there is low co-operation between them. Low co-operation and capabilities are related to the informal construction system, whereby individuals are the major clients.

**Table 7: Relationship between linkages and contractors' average turnover in 2003-2005**

Explanatory Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
(Constant)	11.749*** (7.56)	11.414*** (7.847)	11.99*** (7.818)	11.145** * (7.169)	11.211*** (7.255)
Ln experience	0.871*** (3.444)	0.89*** (3.797)	0.865*** (3.504)	0.915*** (3.719)	0.875*** (3.562)
Log managers' educ.	0.675 (1.037)	0.714 (1.179)	0.521 (0.806)	0.942 (1.456)	0.97 (1.495)
Dummy managers industrial skills	0.962* (1.757)	1.03** (2.031)	1.034** (1.927)	1.043** (1.948)	1.018** (1.911)
Dummy formality of a firm	2.286*** (3.897)	1.636*** (2.808)	2.274*** (3.946)	2.012*** (3.38)	1.924*** (3.169)
Captive/hierarchy vs. relational/modular	-0.337 (-0.42)	-0.682 (-0.91)	-0.308 (-0.40)	-0.542 (-0.69)	-0.513 (-0.656)
Dummy subcontracting arrangements	0.188 (0.649)				
Dummy access to organisational clients		1.154*** (3.461)			
Dummy access to organisational subcontracting			0.507* (1.724)		
Dummy reliable clients (assured market)				0.582* (1.841)	
Dummy reliable organisational clients					0.646* (1.88)
Adjusted R sq	0.617	0.668	0.631	0.633	0.633
F-Value	21.421	26.163	22.62	22.817	22.884
Observations	82	83	82	82	82

**Notes:** Dependent variable: Average turnover for 3 years (2003-05) transformed into natural logarithm.

\*\*\*, \*\*, \* Significant at 1%, 5% and 10% levels respectively.

Values in the brackets are the t-statistics

Model 3 considers the final clients of main contractors that subcontracted sample firms as captured by organisational subcontracting arrangements. The results for this model reveal that contractors which were involved in subcontracting arrangements that linked them with organisational clients attained higher turnover than their counterparts, and the difference between them is significant.

Among the reasons that may explain the relationship between contractors' performance and organisational subcontracting arrangements is that the co-operation between contractors subcontracted for the work offered by organisational clients and the main contractors is likely to be higher than when they are subcontracted to work for individual clients. Main contractors working for organisational clients are also likely to have higher capabilities than those working for individual clients. These observations are consistent with the argument by Nadvi (1999) and Knorringa (1999) that co-operation between producers and buyers with more capabilities is relatively high, and hence results in high performance. Organisational clients have higher financial position than individual clients, thus, are likely to offer advance payments. They are said to utilise building consultants, who offer technical advises to contractors. They also offer a reliable market since they are likely to contract firms frequently. Thus, small and informal firms subcontracted by main contractors working for organisational clients seem to access substantial joint action, hence better performance than those subcontracted by main contractors working for individual clients.

Looking at other proxies of passive vs. active linkages, the results in Model 2 reveal that firms that had access to organisational clients attained higher turnover than their counterparts, and the difference between them is very significant. As noted in Section 2, contractors working for individual clients suffer from delayed payments and frequent stoppage of construction activities (Mlinga & Lema, 2000). These problems may in the long run reduce the turnover of contractors.

When small and informal contractors do better jobs for their clients, they are likely to benefit from having a reliable market, as their clients, particularly organisational ones, are likely to contract them frequently. As indicated in Model 4 and 5, firms that had access to reliable clients and organisational reliable clients attained higher turnover than their counterparts. When clients contract small and informal firms frequently, the possibility to co-operate in different dimensions (viz., advance payment, technical advises from organisational clients' building consultants) is likely to be high due to the developed level of trust among them.

As noted in Section 2, co-operation between contractors and other parties such as suppliers of building materials, is also likely to be high as contractors have the opportunities to source building materials themselves. This may enable contractors to access credit purchases from suppliers, and to exchange technical information. On the other hand, business relationship between contractors and suppliers of building materials is likely to be weak when the former work for individual clients since these clients source building materials themselves (Oforo, 2001). As argued before, small and informal contractors may also lack access to advises from building consultants as

the majority of individual clients do not utilise consultants; and when they do, they go for cheap foremen who are sometimes incompetent (Mitullah & Wachira, 2003).

#### *Governance structures and contractors' performance*

With respect to the indicator capturing governance structure, the results reveal that contractors' performance is negatively associated with hierarchical/captive linkage vs. relational/modular linkage, but the association between the two variables is insignificant. The sign indicates that firms operating under captive linkages—and hence are provided with specifications of buildings, told what to do, and are closely supervised—have low bargaining power, and perform poorly. Insignificant relationships might be because the majority of small and informal contractors seem to operate under captive governance structures. Probably the indicators—close supervision and receipt of building design and specifications—are not a good measure of hierarchical/captive linkages vs. relational/modular linkage given the nature of the construction industry in Tanzania.

#### *Contractors' capabilities and performance*

Other explanatory variables that have a significant effect on firms' performance are only briefly reported since the study focuses on linkages. With respect to firms' formality, the results reveal that formal small contractors attained higher turnover than informal firms, and the difference between them is significant in all models. This finding is in line with the views by Levenson and Maloney (1998) and Jaeckle and Li (2003) that formalisation is like a normal input in the production process, and therefore it determines the level of output and growth. Thus, being members of CRB, small contractors are likely to benefit from networking activities and access to business information. They are also likely to have more access to reliable markets as organisational clients like to contract registered firms, and CRB emphasises that subcontracted firms have to be registered. Additionally, small contractors are likely to have more access to productive resources, viz., financial services. Despite having limited access to productive resources, reliable market and business information, informal contractors are, by CRB policy, restricted to undertake projects whose value exceed TAS 5m, while small ones are allowed to perform the work with the value of up to TAS 150m.

The age of the firm (business experience) has also a significant positive effect on contractors' turnover. Contractors who have been in business for a long time are likely to have strong networks with other parties in the industry and clients provided they perform their work efficiently and effectively. Through long-term experience, a contractor has the possibility to position him/herself in the market and has access to more business opportunities, viz., more clients as the majority prefer to contract firms with a well-known background. Furthermore, contractors who have been in business for a long time are likely to have more access to financial services. Business

experience in the construction industry is also among the factors taken into consideration when a contractor moves from lower to upper classes.

Managers' level of education has an insignificant relationship with firms' turnover. Limited relationship between managers' education and performance has been observed by other studies (e.g., Admassie & Matambalya, 2002; Ishengoma, 2006) that focused on the foods and beverages manufacturing sector in Tanzania. This finding supports the observation by Ishengoma (2006) that managers' education, measured by years of schooling, is an inappropriate proxy as it overlooks the quality of managers' education and their innate abilities.

Regarding managers' skills, the results indicate that a firm with at least a manager with advanced industrial skills attained higher turnover than those without a manager with industrial skills, and the difference between them is significant. This finding is consistent with the observation by Bagachwa and Mbelle (1995) and Ishengoma (2006), which emphasises the consideration of managers' skill composition. A firm comprising of a management with advanced industrial skills stand a better chance to successfully bid for a relatively complex construction projects.

### **Conclusion and Recommendations**

The aim of this paper was to examine the role played by linkages in determining the performance of small and informal contractors, while controlling for firms' capabilities (managers' level of education and advanced industrial skills, business experience) and formality. The empirical findings reveal insignificant performance difference between small and informal contractors with access to subcontracting arrangements and those without it, which might be due to low cooperation extended by main contractors to subcontracted firms. Furthermore, main contractors might also have low capabilities, thus are unable to support subcontracted ones (Nadvi, 1999; Knorringa, 1999).

Considering the possibilities for main contractors to have more capabilities and cooperation with subcontracted ones, the paper suggests the need to incorporate the final clients in the analysis. By incorporating the final clients, the results reveal that small and informal contractors with access to organisational clients, those with access to organisational clients through subcontracting arrangements, and those with reliable clients (i.e. assured market) performed better than their counterparts.

At firm level, the paper recommends to managers/owners of small and informal construction firms to participate in subcontracting arrangements that may link them to organisational clients if they want to increase their performance. They

may also need to do better work in order to retain their clients as having clients who contract their firm frequently seem to increase their performance. They should also try to have access to organisational clients.

Based on descriptive results, management may need to consider utilising managers with high level of education and industrial skills. Management also need to formalise their businesses if they want to have access to organisational clients, who are reliable clients, and thus an assured market; and to participate in subcontracting arrangements that link them to organisational clients. From policy perspectives, stakeholders may need to take initiatives that encourage small and informal contractors to utilise and train their managers in the field of construction and to formalise their businesses. They also need to offer incentives to main contractors working for organisational clients in order to encourage them to subcontract small and informal ones.

With respect to governance structure, the results reveal an insignificant effect of captive/hierarchical vs. relational/modular linkage on contractors' performance. The paper suggests the need to look for other indicators that may be used to measure captive/hierarchical vs. relational/modular linkage.

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