

Software design for informal setups: Centring the benefits

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Abstract

Appropriating technology for the benefit of the very poor is a key theme of Information and Communication Technology for Development (ICT4D). Our aim is to design systems that reduce the challenges faced by the poor in the informal sector of the labour market. However, designing for a non-structured problem area involving socio-economic webs is challenging and requires more than just the 'normal' user requirements gathering techniques. In such social problem areas solutions must prioritize the direct benefits for the target groups. In this paper, a novel design technique for designing in an informal sector problem areas, the case of day labour market, is presented. It involves iteratively reviewing field work results of a long term study, reinforcing those findings with existing literature and eventually critically validating the requirements using existing Management Information Systems (MISs). In this method, benefits to target users are placed at the centre throughout the design process. Our design outcome and its relation to the design process are also presented.

Index Terms — Day labour, Action Research, ICT4D

1. Introduction

Poverty in the developing world and Africa is rampant. The majority of the poor find work in the informal sector. Information and Communications Technology (ICT) can benefit even the poorest in the informal economy [1]. Designing technology in informal settings is challenging. Researchers and designers entering this diverse space have few points of reference [2] while the problem area is unstructured and stakeholder relationships are complex. Although it is easy to specify the technical requirements to set up a PC with internet access in a slum or a remote agrarian village, making a meaningful impact for a poor migrant worker or rural farmer is an altogether different problem that requires considerations of local economy, cultural norms, and stakeholder needs [3].

In our example of the day labour market, regulation is minimal, leading to different organizational groups

structuring their activities in many diverse ways. This makes it complicated for researchers to understand the setting. Understanding the context by researchers is always a prerequisite to any intervention. It is this challenge that we addressed in coming up with a generalized design for an Information Management Systems for the day labour market in Nairobi, Kenya, Cape Town, South Africa and Windhoek, Namibia.

In this paper, a novel design technique for designing in informal sector area of the day labour market is presented. In this method, benefits to users are placed at the centre throughout the design process. Our study methodology is Action Research (AR) [22]. The design work presented here is the first cycle of our AR process that will in future see us through a number of similar iterative cycles.

The aim of our work is to improve the functioning of the day labour market by using an internet based Information Management System. In order to design the system, a substantial amount of work was done on understanding the day labour market. This was done via extensive fieldwork studies in three African countries, literature review and deploying prototype systems. We also critically evaluated different information systems that have tried to provide benefits to the stakeholders in the day labour market. In this paper, design process of a generalized web based Information Management System for day labour market is presented. The design outcome is also described.

1.1 Day Labour Market

The term "day labour" refers to a type of employment arrangement not covered or regulated by formal labour laws [4] [5]. Day labour workers are workers whose job contracts are mainly on a daily basis. As was found in the field study, contracts may go beyond one week, a month or longer than a month. A day labourer therefore is someone who gathers at a street corner, an official hiring site, or other spots to sell their labour for the day, hour, or for a particular job [6].

The day labour market consists of three primary main actors: the employers, the employees or day labourers, and labour market intermediaries. Intermediary

organizations are those organizations and individuals positioned between employers and job seekers [7]. They are mainly nongovernmental organizations, local government agencies, church groups and sometimes even individuals. Day labour employers hire day labour workers, either directly or through intermediaries. The day labour market provides opportunities for low-skilled low-literate job seekers. For worker hire sites to accrue benefits to workers, the other two major stakeholders of the day labour market must also benefit from the arrangement.

Day labour worker collection points are open air places where workers congregate every morning whenever they are out of work and ready to be picked up by employers. These spots have different names such as worker collection points, worker centres, worker corners [8] and even open air labour market. *Day labour centres* are “loosely regulated hiring sites where workers may seek employment under relatively structured conditions” [10]. Such centres are not employers but rather an intermediary and a regulating authority between the two primary actors in the day labour market: employers and employees [4]. Day labour worker centres are not labour brokers as they do not charge for their services. Valenzuela (2003) quoted in [4] categorized day labour centres as a type of formal hiring site. These hiring sites include connected and unconnected sites. *Connected sites*, are those

that are created or located near employment premises such as factories, construction sites, home improvement and related stores. *Unconnected informal day labour sites* are often busy intersections e.g. street intersections, roundabouts or roadsides where employers can drive up and gather individuals available to work for the day [9].

1.2 Worker hire sites in Africa

Blaauw, *et al.* (2006) estimated that there are nearly 1000 places in South Africa where people are picked up and a minimum of about 45 000, mostly black African men, stand at these sites every day, seeking work [11]. Our field work findings from Nairobi Kenya, Cape Town South Africa and Windhoek Namibia confirmed this. Although Melendez *et al* [4] gave a general categorization of the day labour market, their focus was on worker centres. Most African worker hire sites are either connected or unconnected. We further categorize connected and non-connected worker hire sites as being run by intermediary organizations or by workers themselves. Worker hire sites run by workers are referred to as *self-organizing*. In *self-organizing* worker hiring sites, employers interact directly with workers or through contractors. In either of the cases, a triangular relationship between the three day labour market major stakeholders is seen (Figure one).

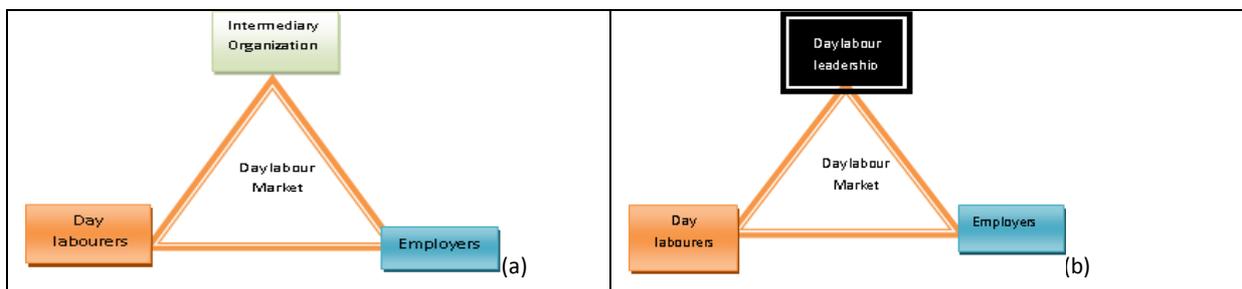


Figure 1: Triangular relationship for day labour market stakeholders. (a) shows a relationship where an intermediary organization comes in between the day labourers and the employers. In (b), a self-organizing day labour stakeholder relationship is shown. The day labour leadership is optional in some day labour markets.

In this study, based on data collected in three African cities, we pick out three things that differentiate the relationship between day labour market in the developing world with those in developed countries. The major differences are: (a) although relationship between the three stakeholders is triangular, African settings rarely have worker centres; (b) while connected worker hiring sites are *self-organizing*, *non-connected* worker hiring sites are either *self-organizing* or are regulated by intermediary organizations; (c) because the day labour market is not well regulated, different organizational groups structure their activities in many diverse ways. This makes it complex for researchers to comprehend the settings, which is always a prerequisite to any intervention.

1.3 Importance of day labour market and why design for it

Day labour worker centres have been found to improve the employment outcomes of the day labour market [4] [12]. Day labour centres are more organized than connected and non-connected worker hire sites that are managed by either workers or nongovernmental organizations. Non-connected and connected worker hire sites are however the only ones we found in the three African cities. As a result they do not provide some of the advantages and benefits provided by worker centres. The intermediary organizations we found and the organizations run by workers do however help in providing some benefits to workers [14]. These benefits to both workers and employers are summarized in table 1.

Managing the complex triangular relationships (see Figure one) among day labour stakeholders is not easy. In

South Africa for example, it was found that one intermediary organization manages up to 20,000 workers. Without a good information management system, chances of realizing the day labour market benefits dwindle. All the benefits brought about by day labour market will be eroded if record management of workers and employers is not well maintained.

2. Design process

In this section, our design process is outlined. The aim was to maintain existing benefits and bring in new benefits to the day labour market by designing and building generalized Management Information Systems (MIS). Our design process is an iterative design process with four sub sections each with an objective. Figure two illustrates the process.

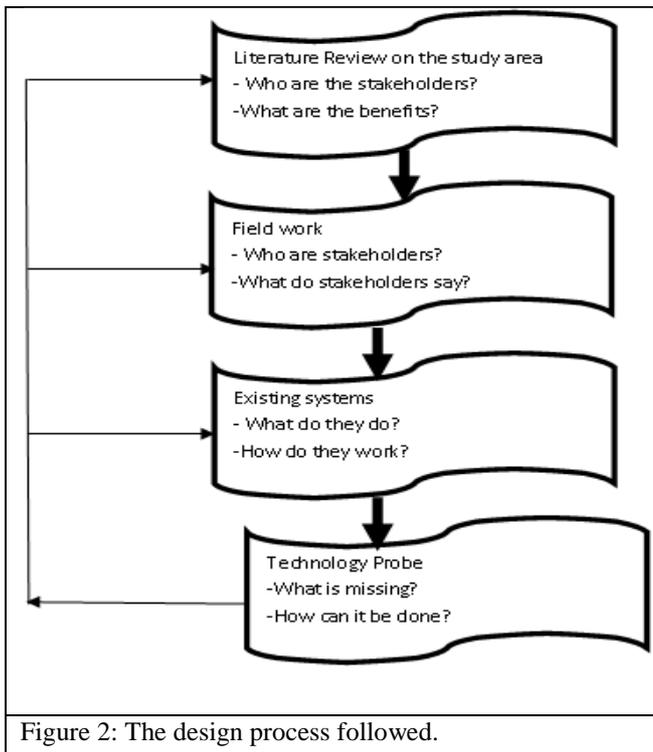


Figure 2: The design process followed.

Step one: Literature review and Field studies

The study started with field work in Nairobi, Kenya, Cape Town, South Africa and Windhoek, Namibia by the first author. In Nairobi, both connected and non-connected worker hire sites were identified, solely managed by workers. In Namibia, non-connected sites under an intermediary organization (Men on the Side of the Road Namibia— MSR NA) formed the majority of worker hire sites. Cape Town had both *self-organized* and intermediary organization regulated worker hire sites.

In these field studies, we sought to understand the interests of each stakeholder in the day labour market. Guided by literature, e.g. [5] [11], we listed possible benefits for each stakeholder and alongside it provided information that needs to be stored about them (Table 1). We note that benefits listed in the table include sub-benefits of those listed in Section two of this paper. The information, together with the critical analysis of selected day labour MISs implemented in Africa informed our design. Past related work was also used in identifying various benefits to the day labour market.

Table 1: Day labour benefits versus information needed

	Benefits	Information
1	Establishing minimum wage	Minimum wage, Employer's offer, Actual payment, Skills category
2	Humanizing day labour work and correcting any negative perceptions about day labourers	Employers contacts e.g. email, telephone, Events calendar details
3	providing moral and psychological support to member workers	Worker personal information, Number of dependance, Health status, Personal stories
4	Provide a means of worker screening	Worker history, Worker references, Worker duration in hiring site, Previous assignments
5	Training: Skills advance and personal presentation	Worker skills, Worker training needs, Worker education level
6	Career progression support	Worker education level, Career options
7	Finding opportunities for workers to find themselves work e.g. CV	Worker records, Programs details e.g. business cards printing, Number of workers
8	Aid in meeting government and donor regulations and/or requirements	Personal details e.g. gender, age, nationality Financial records e.g. amount spent
9	Providing employers with correct skills and character	Worker references, Worker character record

10	Save employers time and money	Worker contacts, Worker skills
11	Save time and money to worker site organizers	Worker contacts, Worker address, Employer address, Employer contacts
12	Equitable and efficient distribution of jobs	Worker skills, Job allocation queue details Jobs allocated

Step two: Validating Information

Our second step was to validate the information that needs to be stored about employers, workers

and intermediary organizations. To achieve this, we identified day labour worker hire web based MIS in Africa. Through web search, media advertisements, and personal contacts and in consultation with day labour market experts, the following seven systems were identified:

Table 2: Identified day labour market MISs

Cite	System	Description	Included
[15]	Men on the Side of the Road, South Africa (MSR SA)	Web based day labour management system with web based interface for workers	√
[16]	placements partner	An intranet based worker hire system	√
[17]	Men on the Side of the Road, Namibia (MSR NA)	Web based day labour management system with web based interface for all the three stakeholders	√
[18]	Nifulie	Web based day labour market MIS.	√
[19]	kazi560	Web based job search MIS. It makes money by selling services to workers and employers and hence not beneficial to them. It benefits employers who hire non day labour workers	X
[20]	Dreamworker	A website giving information on their functions with regard to connecting day labour workers and employers	X
[21]	Kazileo	Similar to Kazi560 and do not have functions for use in screening workers for character and skills.	X

Table 2 lists day labour MISs identified and whether they were included for analysis. Day labour management information systems from developed countries were excluded because they were modelled around worker centres. Because we were looking at designing an MIS that would help in bringing about benefits to workers, some MISS, such as those described below, were dropped from further analysis:

Kazi 560 and Kazi leo: eliminated because they are not directly beneficial to workers as they make

their money by selling services to them. Secondly, they do not deal with day labourers.

Dreamworker: excluded since we were not able to identify an MIS for both workers and employers. The “FIND A JOB” section of their website shows that their market management is done manually.

‘Nifulie’: This has since been discontinued or moved, but was a typical day labour market MIS. It had information about workers and employers. It however did not follow-up on worker or employer screening.

Table 3: Analysis of existing systems on whether they deliver identified benefits to target users

	MIS/Benefits	1	2	3	4
1	They establishing minimum wage	√	X	X	X
2	Humanizing day labour work and making clear any negative perceptions about day labourers	X	√	√	√
3	providing moral and psychological support to member workers	X	X	√	X
4	Provide a means of worker screening	√	√	√	X
5	Training: Skills advance and personal presentation	√	X	√	X
6	Career progression support	X	X	√	X
7	Finding opportunities for workers to find themselves work e.g. CV	X	X	√	X
8	Aid in meeting government and donor regulations and/or requirements	√	X	X	X
9	Providing employers with correct skills and character	√	√	√	X
10	Save employers time and money	X	√	X	√
11	Save time and money to worker site organizers	X	X	X	X
12	Equitable and efficient distribution of jobs	X	X	√	X

(1) Placement partner, (2). Worker hire, (3). MSR NA and (4). Nifulie

MSR SA, MSR NA and placement partner were identified as classical day labour MISs. They were found to provide differing benefits. Table 3 shows the capabilities of the day labour market MISs identified and their corresponding benefits. Fundamentally MSR NA was originally worker hire MIS that was since extended by including a spreadsheet for record keeping. Consequently it has created a “new system” that can provide more benefits. Similarly MSR SA has supplemented worker hire with placement partner despite placement partner being an independent MIS for day labour market. It is mainly used internally by worker hiring agents. Nifulie has since been

stopped or moved to an address that we could not establish.

Step three: Technology probe

In the final process of the design, we carried out a technology probe [13]. A prototype system, with a mobile phone client module, was designed, implemented and evaluated with the largest intermediary organization in South Africa, Men on the side of the road [15]. The findings were used to validate design concepts earlier generated.

3. Resultant architecture

In this section, the outcome of our design process is presented (Figure three). It has four major modules, each associated with different day labour stakeholders.

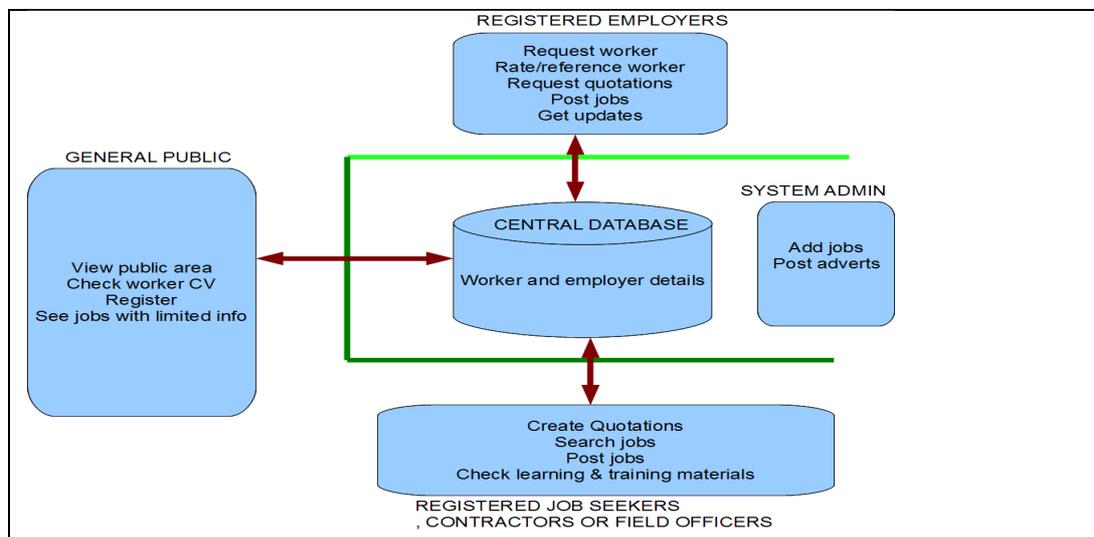


Figure 2: Generalized design outcome

General public module

This module serves the general public and presents the idea of day labour. Any person who stumbles on the module is notified of the activities and can see, with limited access, sample worker details. It also gives members of the public a chance to know who is involved. Its purpose, amongst others, is to help in removing any negative perceptions about day labourers and day labour market in general. Members of the public who choose to become members of the day labour market can do so here.

Registered employers' module

The module enables registered employers to publish jobs. It contains details of employers who give permission to day labour market to keep their details. Such employers, once logged in, can access full worker details that may include downloading worker *curriculum vitae*. Registered employers are valuable to any day labour market as they help in referencing and rating workers.

Job seekers, field officers or contractors' module

Job seekers, field officers or contractors' module is the third and the most important module of this design. In our study, it was noted that the three stakeholders, each representing the main stakeholders of the day labour market, contribute in similar ways. The module allows for updating workers information, job searching, job posting, personal stories or comments, access to learning materials and creation of quotations. This module allows workers to find themselves work, training, career progression support, moral and psychological support among others. In our findings, job seekers, contractors and field officers' share similar functions. This is the main reason why the three stakeholders share the same module.

Administration Module

The last module is the administrators' module. This is basically a support module. It facilitates system configuration functions that include adding new

items such as skills, advertisements, news and users. Setting variables such as minimum wage is one of the key functions of the module and serves to meet one of the benefits for day labour market. Capturing and reporting on information that can aid in meeting government and donor legal and financial requirements is also among the functions of the admin module.

The design outcome presented in Figure 2 is currently under evaluation. It is expected to undergo evaluation in two day labour markets, namely Windhoek, Namibia and Nairobi, Kenya.

4. Conclusion

Work to describe a design process applied to informal sector, a case of day labour market has been described. The design process consisted of four major steps with each step paying attention to stakeholder benefits. Using field study findings and literature review, we identified benefits to day labour workers, employers and intermediary organizations. These benefits were then validated by analysing existing MISs for day labour market. Finally, we designed and deployed a mobile phone application as a technology probe. The purpose for the technology probe was to clarify and get more benefits for the day labour market. The outcome was a generalized design architecture for day labour market MIS.

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