VOLUME-7, ISSUE-9, SEPTEMBER-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Engineering

SUYOG - SMART CARDS FOR THE RURAL INDIA

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ABSTRACT

Suyog, a Hindi word, which means "solution", aims to solve rural socio-economic imbalance by making a system that answers the questions of identity, employment and micro-transactions and therefore self reliant. These have been prototyped using a Radio Frequency ID tags and an Internet of things (IoT) platform. Rural mass in India are unaware about the sustainable economic development. Whatever we have today they are to be used by present generation. nothing will be left out for the future generation. It is high time when all should think of next generation's welfare and their survival. We must understand the concept of sustainable economic development. This is the need of hour. This paper discusses how these smart cards when integrated in government initiatives can contribute towards sustainable development of the rural areas. Citizenship, income group, digital transactions, social group, voters ID and tax payers' card are all essential part of having an identity but all this being segregated is a cluttered concept, whereas Suyog advocates an amalgamation of all these aspects of ones' identity.

KEYWORDS : Internet Of Things, Digital Economy, Sustainable Development, Aadhar Uid Cards

INTRODUCTION

According to 2011 Census, 68.8 per cent of country's population and 72.4 per cent of workforce lives in rural areas. India is predominantly a rural country with two third populations and 70% workforce residing in rural areas. Rural economy constitutes 46 per cent of national income. Despite the rise of urbanization more than half of India's population is projected to be rural by 2050. Thus, the growth and the development of rural economy and population are a key to overall growth and inclusive development of the country.

As most of the Indian population consists of the rural population, our proposed idea targets the rural India. The smart card with Radio Frequency Identification (RFID) integrated in it not only acts as a digital identity proof but also as a pocket wallet and a digital resume.

Amidst all the Unique Identification Authority of India (UIDAI) chaos, a smarter system is the need of the hour. Moreover, the system needs seamless compatibility and integrations with other Government schemes. In a rural ecosystem, web based internet applications and mobile applications on smart phones are rendered useless, and the need for raw hardware for any technology to be integrated can scale quickly. Emphasis on the penetration for digital India and a skilled India diminishes in a rural ecosystem. We need a card which answers all these questions, identity, digital payments and skill learning. Skill India is a great platform for people to learn vocational skills, which will be our primary target to partner with.

A large chunk of the economy is informal, unorganized labour, for which it's harder to collect taxes. This digital payments increase economic independence and can also help lower crime rates when people are mugged for money. Two step verification and encryption helps in safer transactions and this will help more than 72% of the Indian population, living in rural areas.

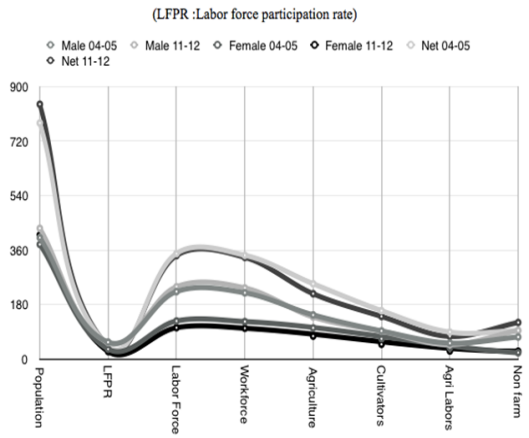
Integrating this in an already set up government ID card system will help people learn more skills. Besides all notifications regarding payment, identity and skill learning like knitting, typewriting is sent by SMS, leaving expensive smart phones out of the rural loop.

ECONOMIC OUTLOOK

A. Withdrawal of female from the labour force

The table below shows changes in population with respect to work force in the rural areas. [ii]During the period of high output growth and falling employment (2004-05 to 2011-12), rural population increased by 62 million, distributed almost equally between male and female (Chart 1). As indicated by labour-force participation rate , the proportion of male population joining labour force remained almost unchanged. However, female labour-force participation declined significantly from 33 per cent in 2004- 05 to 25 per cent in 2011-12, resulting in decline in the female labour-force by 22 million. This led to a net decline of about 7 million in rural labour-force (male + female) between 2004-05 and 2011-12. This data from the National Sample Survey Office (NSSO) of the Ministry of Statistics and Program Implementation (Government of India) did not show any change in unemployment (based on usual status) during this period which implies that the workforce in rural areas reduced by a similar magnitude as in the labour-force. Based on these evidences it is theorized that the decrease in labour-force was primarily due to the withdrawal of females from labour force during the period under consideration.

Chart 1 Trend in rural economically active person during 2004-5 to 2011-12 (millions)



Some scholars have offered explanation for the withdrawal of female from the labour-force One of the reasons for the fall in female LFPR is reported to be their increased enrollment in education.

Clearly, females of agricultural labour households do not prefer to go for farm work. Some evidences indicate non-availability of **non-farm employment opportunities** rather than lack of willingness for outside work as the reason for de-feminization of rural workforce. There is evidence that female labour participation rate further declined after 2011-12. It is necessary to develop avenues for such female workers to bring them out of domestic boundaries and engage in productive activities. Ergo, there is a need for connecting these willing females in a productive economic activity. While there are number of programs for rural employment, there is a need of a streamlined process. The famous employment program which is in force and rural mass are being benefited is Mahatma Gandhi National Rural Employment guarantee Act (MNREGA). Many rural mass, especially, female forces have been benefitted by this program. No doubt there many more programs. But maintaining an

online database on the cloud with respect to the number of unemployed females, job opportunities will help us understand the demographic better with respect to the location of the demography.

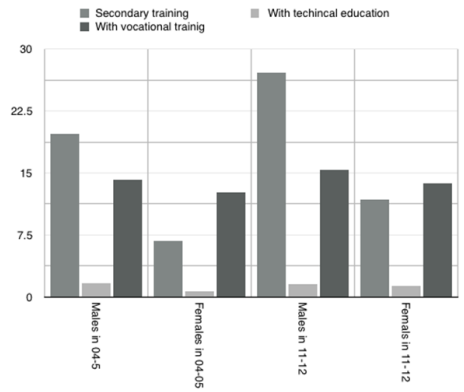
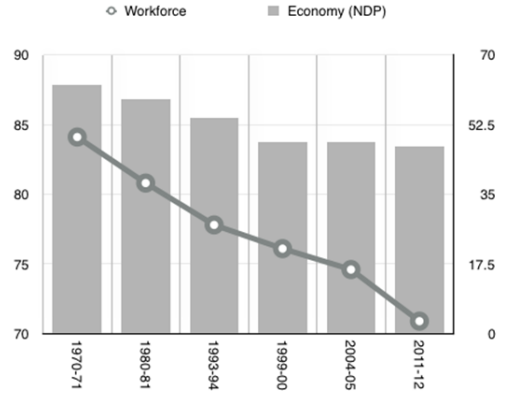


Chart 2 Education level of usually employed rural workers of age 18-59 years

Chart 2 shows somewhat increment in the number of people in the rural areas for secondary education and with vocational training. Although Increasing enrollment for education is a desirable trend in terms of improvement in educational level and skills of the persons. But the real challenge will be to create employment opportunities for those educated people and who join the labour-force after acquiring the education in the near future through Labour Education Program/Adult Education. Most of the employment opportunities have to be created in non-farming sector as the natural choice of the educated youth who would be able to join more productive non-farm sectors instead of agriculture. Small-scale industries can be stated in rural areas for rural mass, especially for female force. For example, for making jam out of the agricultural products and preparing orange squash. Other rural youth can be involved in packing.

With the mobile phone penetration stronger than that of toilets or clean drinking water in the rural areas, spreading awareness with text messages on these feature phones should be a good way to advertise. It must also inform the rural mass about the weather forecast. It may inform the farmer about the rain. Moreover, connecting this group of educated youth and females who have withdrawn from the agricultural workforce can be connected to non- agricultural initiative or a skill center with the smart cards.[iii]

The increase in the number of feature phones is backed by the numbers provided by the Telecom Regulator Authority of India (TRAI), according to which currently there are 499 million mobile subscribers in rural India (June, 2017), and another report points out that rural markets account for 60% of the new mobile subscription growth in the country.



Economic Inclusion

Chart 3 shows the share of rural areas in net domestic product ("Economy") and Rural employment ("Workforce")

The declining rural share in national output without a equivalent decline in its share in total employment during the past four decades implies that a much faster growth in capital-intensive sectors in urban areas did not generate adequate employment to absorb rural labour.[iv] This clearly indicated that urban jobs couldn't absorb them completely. Pointing out the need to tackle the dearth of opportunities by emphasizing on both vocational training and capturing the skilled and trained labour. Ergo, the smart cards will serve as platform for economic inclusion for the rural workforce.

The lack of required skills and technical knowledge are the main barrier for rural workers to enter the manufacturing sector. Setting up of industries and improvement in infrastructure is the necessary but not sufficient conditions for increasing rural employment which requires effective human resources development programs to impart necessary skills and training to rural youth to match the job requirement in manufacturing sector.

Growth can be harnessed by developing and promoting new farm models based on knowledge and skill based agriculture and post-harvest on farm value addition. The *Pradhan Mantri Kaushal Vikas Yojana* (PMKVY) can play a major role in this by promoting and imparting skills provided the correct demographic is targeted and reached on time.

C. Tax Revenues

Just over 2 crore Indians, or 1.7 per cent of the total population, paid income tax in the assessment year (AY)

(2015-16) according to the data released by the Income Tax department.[v] Although number of income-tax return filers increased to 4.07 crore in assessment year 2015-16 (FY 2014-2015) from 3.65 crore in the previous year but only 2.06 crore actually paid tax as the others claimed income below taxable limits. This is both cumulative of rural and urban population. This clearly points out the non-payment and underpayment of tax in the economy. A large chunk of the rural economy is informal, unorganized labour, for which it is difficult to collect taxes. Digital payments in the form of micro transactions confront this issue and getting more people inside the taxable net as opposed to the informal economy, and as cash transactions is removed this equation, we can get rid of numerous malpractices which happens at the grassroots level. Digital payments increase economic independence and can also help lower crime rates when people are mugged for money.

III. FUNCTIONALITY

To understand more clearly as to how the smart card can help us neutralize the socio-economic problems of a given rural area, understanding the functions of the smart card is necessary.

A. Skill Share

With programs like National Skill Development Mission, National Policy for Skill Development, National Apprenticeship Promotion Scheme of Ministry of Skill Development & Entrepreneurship coming up to provide vocational training towards a more sustainable development of our workforce.India has over 4200 industrial training institutes imparting education and training 43 engineering and 24 non- engineering trades. Of these, 1654 are government run ITIs (State governments) while 2620 are private. The total seating capacity in these ITIs is 6.28 lakh.

The card when scanned will serve as an ID card for all these skill initiatives, once integrated with the schemes. They are also equipped with the web application which guides through the amount of skill learned. Moreover, it's a great benchmark for any employer to asses a candidate.

The availability of employable skills is one of the major factors of how readily new job seekers find employment. The very low

level of employable skills makes the search for work much harder. It reduces the market value of the job seeker and adds to the costs of employing institutions that must train new recruits from square one.

In addition, about 1.65 lakh persons undergo apprenticeship vocational training every year in state-run enterprises. If a wider definition of applied courses is taken that includes agricultural, engineering and other professional subjects, the total number receiving job-related training is about 17 lakh per annum, which still represents only 14% of new entrants to the workforce.

This points out in the direction of problems with awareness, the willingness and the resources available to the rural demographic. All the three of these can be tackled with nothing but an initiative in the grassroots level with appropriate promotion

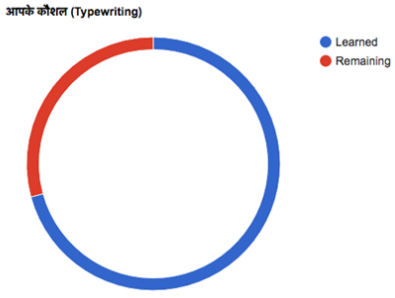


IMAGE 1 above showcases how skills look on the web application, intuitive visualization helps understanding better

B. Work Experience database

The web application linked to this concept card also has the capability to store vital information relating to one's past work history.

Government's initiatives like *Sampoorna Grameen Rozgar Yojana* 2001, National Rural Employment Programme (NREP) (1980) and Rural Landless Employment Guarantee (RLEG) (1983), some of the many initiatives are taking place in the rural sector. An online database of all the opportunities that a person has got will not only aid them to find other jobs and migrate beyond what the hard copies documentation in local inventories but also for other agencies to analyze with respect to demographics. Moreover, a global database can help rural employers not be limited to just one village but multiple.

C. Digital Payments

Although Aadhar cards have to be linked with a bank account though it is not directly linked to payments. While an online repository for work experience and skill learnt can serve as means for improving one self, the payment aspect will have a more diurnal use.

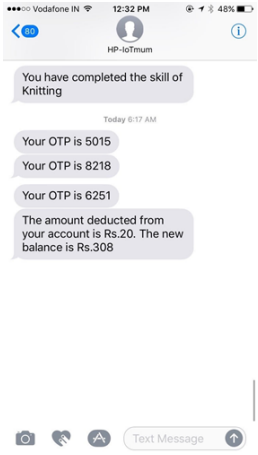


Image 2 above shows how the user will receive text updates about the completion of a skill and a digital payment in action

The primary goal with Suyog has always been towards economic independence, these cards will facilitate transaction, and hence, withdrawing cash after a hefty paper work can be avoided in a ecosystem where ability to read and write is limited. These smart cards can also help lower crime rates when people are mugged for money, while a card theft is still possible, we can evade unauthorized usage as transactions are incomplete without the two step verification from the user which includes an OTP and a transaction password. Other economic aspects such as increment in tax revenue generation from these micro transactions have also been discussed in this paper.

D. Identity Proof

The prototyped smart cards will also facilitate to an identity proof. While the *Aadhar* article points out that it is neither a direct proof of citizenship nor address,[vi] steps should be taken to make a common document for identity. We aim to strive for the same. Once printed, these RFID cards will be equipped with a photo of the person along with address and age to be useful as a document.

IMAGE 3 shows all the details about the user such as amount of skills learnt, past job roles and balance in the account

ABOUT THE PROTOTYPE

A. Hardware

The hardware as compared to other IoT is pretty basic. The hardware module has assembled using a RFID scanner, an Arduino microprocessor and a GSM (Global System for Mobiles) chip for communication, in an I2C (Inter- integrated circuit protocol) connection. Another variant with a Wi-fi chip has also been developed. While the scanner scans a smart card the microprocessor sends a get request to the web application with the cards' ID. It has been designed in a way that it consumes minimal power and hence can be operated from a small battery. Since our target group is of a rural background and rural mass, being cost effective was the number one priority. As most of the encryptions and decryption take place over the air (OTA) hardware costs are drastically reduced.

TABLE 1 above shows cost incurred in prototyping, giving a competitive edge to other IoT based platforms

Unit	Cost
RFID scanner	330/-
Arduino Nano	300/-
GSM chip	500/-
Fabrication	50/-
Battery and charging modules	150/-
Miscellaneous	20/-
Total	1350/-

TABLE 2 below demonstrate a juxtapose of other card reading products

Unit	Cost
Cost to make one Aadhar Card, with printing and delivery	35/-
Cost to make a Suyog RFID card Including printing and delivery	26/-

TABLE 3 above tables depict the cost effective nature of the smart cards

B. Software

While dealing with money transactions and identity proof, caution must be taken as to avoid unauthorized usage. As mobile phone applications and desktop applications wouldn't find adopters in a rural ecosystem, ***Suyog*** opts for a better alternative for correspondence, text messages. With a growing number of features in mobile, sending one time passwords (OTPs) and other alerts is a viable option. Biometrics is an acceptable form of security but depending solely on that can sometime be risky. The best way to make apps or devices secure is using biometrics security along with another unique customizable token such as a password. This might be more of a hassle but at least it adds an extra layer of security to your information. The bottom line is: you cannot use a biometric as a primary authenticator; it can only act as an extra layer of security for your applications or devices just like an OTP .[vii]

Nevertheless, there are predicaments where data entry can't be avoided say for a skill workshop or a employment center, a Hindi user interface (UI) has been deployed for the ease of use and better understanding. All the request and queries from the web application for skill workshop attendance, updating employment records and money transactions a *PHP* based engine is used with a MySQL database. Besides as the thumb rule for UI dictates the use of graphs as compared to numbers percent of skill learnt and other important numbers are showcased using Google visualization APIs. The online ID card along with skills, employment records and a recent photograph can form as digital resume in an online vault; ***Suyog*** in a holistic view can be seen social network for employers and skill instructors as well.

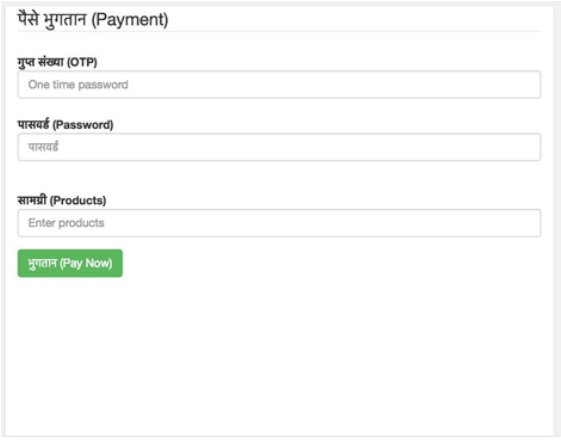


Image 4 shows how a hindi UI can be easy to understand

Aadhar has been the center for a lot of problems, sometimes as basic as spelling mistakes. Such minute details when overlooked can become a glaring mistake as these documents serve as the means of identification for the most of us. Although human error is something we always have to account for, cross-platform integration should help us to get rid of such spelling mistakes.

SCALABILITY METRICS

A. Easy to deploy and time to market

One of the most important factors for any product is the simplicity of design and cost of the same. With the efficient use of resources the simple design of the card -readers can be fabricated and produced in a bulk quantity quickly. With use of laser cutter and 3 D printers, manufacturing chassis and bodyworks for a scanner is quick effective and reliable provided raw materials like acrylic is of an acceptable standard.

B.Deployment Plan: B-2-B Strategic partnership with government organizations

It is a fact that more than 72% of the Indian population resides in a rural environment. Hence, this system targets the majority of the demographic with proper advertising and strategic partnership with government initiatives like *Sampoorna Grameen Rozgar Yojana*, Digital India Initiative, National Skill Development Mission, National Policy for Skill Development, UIDAI and *Pradhan Mantri Kaushal Vikas Yojana*, we can cover ground faster. These initiatives already possess an infrastructure for the system. Our RFID cards provide a link to a database to the user's bank balance, skill set and employment opportunities and hence, will facilitate a streamlined process for these initiatives and in return we require brand association from these initiatives and to be embedded in their off-the-shelf database of all the people in the rural areas. Moreover, a simple hardware allows fast deployment on site and repair, support and cost for development can give a competition wrestle to other NFC based payment services which have started coming out in the market recently, like Samsung Pay which is targeted for a urban society. Another way is loyalty programs and cash-backs which help organizations to grow and sustain markets . In rural areas, gathering capital for micro cash-backs should be easier than urban areas

C. Tackling the competition

Since demonetization, a lot of payment services has made their appearances since November 2016. The NFC based payment service "Samsung Pay" is the closest match to the RFID cards, none are actually target for a rural audience and hence will be one of it's kind. Moreover, with cost efficient prototypes, *Suyog* can give a head on to a lot of the debit and credit card readers available in the market.

D. Engagements with Panchayats

In order to use institutional engagements, some social service organizations engage with village local bodies like *Panchayats*. Collaboration with *Panchayats* ensures that they can monitor each and every migration from that particular village to towns and cities. This experiment with *Aadhar* has been very successful in Jharkhand but has achieved limited success in Bihar. National Domestic Workers Union works in close coordination with Panchayats in Jharkhand, and tracks issues related to trafficking and migration. *Panchayats* are encouraged to issue identification certificates bearing photograph of the worker, along with details of her village, address, and reasons for her migration. It bears the signature of *mukhiya/sarpanch* with a stamp. This document could be used by the worker as an identity proof in metro cities, and can be treated as a baseline document to procure other identification proofs.

VI. CONCLUSION

Amidst a lot of identity chaos and economic problems, we the consumers not only have the right to avail befits of a better technology but also have an underlying duty to improve and suggest towards the betterment of the impuissant. ***Suyog*** smart card ticks all the checkboxes for a better resource for the rural populations as well crosses benchmarks as a product. It is high time when India should consider multipurpose smart cards which will be safe, secure and convenient.People should not be burdened with carrying number of cards.

ACKNOWLEDGMENT

This prototype wouldn't have been possible without the support of the team who were involved in the development of the same. Milan

Dave and Hiral Bhanushali remain an integral part of the team. Besides this, the undying support from our friends, family and well wishers is something we are grateful for.

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