



GOVERNMENT OF KARNATAKA

INFRASTRUCTURE
DEVELOPMENT
DEPARTMENT



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Making Infrastructure Happen

*Sector Specific Inventory &
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for PPP Mainstreaming
Infrastructure
Development Department*

Pre-feasibility Report

Warehouse Management System for Karnataka State Warehousing Corporation-A Pilot Project for 17 Warehouses

Submitted by:

**Feedback Infrastructure
Services Pvt. Ltd., India**

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Table of Contents

1	EXECUTIVE SUMMARY	1
2	INTRODUCTION	9
2.1	STRUCTURE OF THE REPORT	10
2.2	APPROACH & METHODOLOGY	11
3	SECTOR PROFILE	13
3.1	INDUSTRY OVERVIEW	13
3.2	WAREHOUSING IN INDIA	13
3.3	KARNATAKA STATE WAREHOUSING CORPORATION (KSWC)	14
3.4	AGRICULTURE IN KARNATAKA	15
3.5	PPP INITIATIVES IN WAREHOUSING-PRIVATE ENTREPRENEURS GODOWNS SCHEME 2008.....	15
4	PROJECT	18
4.1	DESCRIPTION OF THE PROJECT	18
4.2	BEST CASE STUDIES FOR SIMILAR PROJECTS IN INDIA	23
4.2.1	<i>Passport Seva Kendras in India – A PPP initiative</i>	23
4.2.2	<i>Issue of smart cards by RTOs in Karnataka</i>	25
4.3	PROJECT STRUCTURE	27
5	MARKET ASSESSMENT	29
5.1	WAREHOUSE MANAGEMENT SYSTEMS.....	29
5.2	RELEVANCE OF WMS TO KSWC.....	30
5.2.1	<i>Advantages for KSWC</i>	32
5.3	SITE FEATURES.....	34
5.4	PROJECT DESIGN.....	38
6	PROJECT FINANCIALS	40
6.1	COST ASSUMPTIONS	40
6.1.1	<i>Capital expenditure assumptions</i>	40
6.1.2	<i>Financing assumptions</i>	41
6.1.3	<i>Depreciation assumptions</i>	41
6.2	REVENUE ASSUMPTIONS	41
6.3	OPERATING EXPENSE ASSUMPTIONS.....	42
6.4	VIABILITY ASSESSMENT (NPV, PROJECT IRR, EQUITY IRR)	43
6.5	VALUE FOR MONEY	45
7	STATUTORY & LEGAL FRAMEWORK	46
7.1.	LEGAL & REGULATORY FRAMEWORK	46
8	INDICATIVE ENVIRONMENTAL AND SOCIAL IMPACTS	48
8.1	ENVIRONMENTAL IMPACT.....	48
8.2	SOCIAL IMPACT.....	48
9	OPERATING FRAMEWORK	49

9.1	RISKS & MITIGATION	49
9.2	INDICATIVE PROJECT STRUCTURE.....	50
10	WAY AHEAD	51
10.1	NEXT STEPS	51
10.2	RECOMMENDATIONS	52
11	ANNEXURE	53
11.1	CASH-FLOW STATEMENT FOR THE PROJECT	53

List of Figures

Figure 1: Project Status..... 9
Figure 2: Methodology for the study 11
Figure 3: Benefits of a WMS in the operation of warehouses..... 31

List of Tables

Table 1: Progress of KSWC projects under PEG-2008 Scheme as on October 2011.....	16
Table 2: Warehouse clusters for WMS implementation	18
Table 3: District-wise crops grown.....	19
Table 4: Capacity, occupancy and loans availed at the 17 warehouses identified for WMS roll-out	21
Table 5: Business turnover during 2010-11	22
Table 6: Commodities handled by Gulbarga-II.....	34
Table 7: Origin-Destination	35
Table 8: Stock of commodities at Bagalkote.....	36
Table 9: Year-wise cumulative capacity of Bagalkote warehouse	36
Table 10: Origin destination of goods in the warehouse.....	37
Table 11 : Cluster-wise capital expenditure.....	40
Table 12 : Financing assumptions – Private Partner.....	41
Table 13: Depreciation Assumptions	41
Table 14: Basic assumptions for the project.....	42
Table 15: Assumed annuity payments for the year 2013-2014.....	42
Table 16: Operating expense assumptions.....	43
Table 17: Sensitivity to changes in operating expenses	43
Table 18: Sensitivity to changes in annuities	44
Table 19: NPV of annuity payments.....	44
Table 20: Associated Risks and Mitigation Measures.....	49
Table 21: Indicative project structure.....	50
Table 22: Cash-flow statement	53

1 Executive Summary

Background

Government of Karnataka (GoK) envisages development of infrastructure through Public Private Partnership (PPP) and intends to attract investments in various sectors in Karnataka.

The report details out the prefeasibility study done for 'Implementation of Warehouse Management Systems in KSWC warehouses'.

The project aims to implement real time Warehouse Management Systems on a PPP basis across 17 warehouses in the state, identified by the KSWC.

Sector profile- Logistics

Logistics is a significant part of economy, accounting for 8-10% of the national GDP. Transportation and storage are two main functions within Logistics, dealing with movement and storage of goods, respectively.

Indian warehousing space has a strong presence of public sector entities, with Central Warehousing Corporation and other State-level warehousing Corporations contributing a large share of overall capacity.

In Karnataka, KSWC was established in November 1957 under the Agricultural Produce (Development and Warehousing) Corporations Act 1956, later repealed by the Warehousing Corporations Act 1962. With 123 warehouses and 446 employees on its rolls, the total storage capacity in godowns owned and hired by KSWC, was around 9.59 Lac metric tons as of January 2011. CWC and the state government each have 50% stake in KSWC, having contributed INR 3.9 crores apiece as paid-up capital. KSWC has consistently been a profit making entity over the past decade.

The objectives of KSWC are outlined below.

- To acquire and build godowns and Warehouses within the state of Karnataka.
- To run Warehouses in the state for the storage of Agricultural Produce, Seeds, Manures, Fertilizers, Agriculture implements and other notified commodities.
- To arrange facilities for the Transport of Agricultural Produce, Seeds, Manure, Fertilizers, etc.
- To arrange for disinfestations service to the farmers, Government offices, Public libraries, Hostels, Theaters, Public buildings, Private establishments, Apartments etc., Rodent control, Insect control, Cockroach control are a few specialized services undertaken.

PPPs in the warehousing sector

The most significant PPP scheme in the warehousing sector is the PEG scheme 2008. The main idea behind this Food Corporation of India initiative is to facilitate construction of storage godowns for Central Warehousing Corporation (CWC) and State Warehousing Corporations (SWCs) through the involvement of private entrepreneurs. Under this scheme, the private partners receive fixed lease payments from the Government warehousing agencies in return for building, owning and operating storage godowns.

Implementation of this scheme in the state of Karnataka has been in 3 phases. Phase 1 covers an addition of 37500 MTs to the storage capacity at Hassan, Bagalkot, Belgaum and Mandya. Phase 2 envisages addition of 60250 MTs capacity at Mysore-III, Chitradurga, Harihara, Raichur- II and Chikamagalur. Phase 3 targets an addition of 41000 MTs at Chamarajnagar and Bagalkot.

Project Description

Even though Karnataka has 123 warehouses across the state, they are basic storage spaces. Given the large scale of operations, there is a need for an integrated approach to streamline operations and monitor activities at all warehouses from a central level on a real time basis. Today, Warehouse Management Systems play a pivotal role in integrating the functioning of scattered warehouses and aiding in efficient operations for the managing agency as a whole.

In this context, it was decided to explore the option of rolling out Warehouse Management System for KSWC warehouses on a pilot basis for 17 warehouses. These warehouses were selected in consultation with KSWC, with large warehouses being taken up for the pilot project.

The consultants have divided the 17 warehouses into 3 clusters based on geographical location of the warehouses. Cluster I covers the northern regions of the state, Cluster II consists of warehouses in the central region and Cluster III consists of warehouses in the southern part of Karnataka.

Cluster I	Cluster II	Cluster III
Gulbarga-I	Raichur-I	Koralur
Gulbarga-II	Raichur-II	Tumkur -II
Bidar	Sindhanur	Mysore-III
Bijapur-II	Hospet	Hassan
Bagalkote	Machenahalli	Mandya
Gadag	Chitradurga	

These 17 warehouses together account for 40% of the storage capacity of KSWC warehouses and contributed to 56.32% of the total deposits and 52.18% of the total withdrawals across all warehouses in the state during the financial year 2010-11.

On an average, 200 metric tons of commodities are deposited and 160 metric tons withdrawn every day at these warehouses. Hence, given the storage capacity and the large transactions that take place at

these warehouses every day, it is important that a warehouse management system is in place to streamline KSWC functioning.

Market assessment:

Warehouse management deals with receipt, storage and movement of goods; normally finished goods; to intermediate storage locations or to final customer. Through an advanced software program, it tracks the movement of a commodity through the entire supply chain.

By streamlining inbound and outbound shipments, implementation of WMS at KSWC warehouses would bring the following specific tangible benefits to the corporation.

- **Real-time Stock Management:** The location, condition and amount of goods in all the warehouses can be monitored at one place by KSWC since all the warehouses with WMS would in a way become a part of a connected material and information network.
- **Slotting and Optimization:** WMS helps in determining the optimal slot for the stock keeping Unit based on user defined criteria like size, expiry date, seasonality etc. The criteria can be fine tuned using the past data that gets recorded in the WMS system. Optimal slotting helps in minimizing unnecessary moves and stocking grains of similar quality together.
- **Electronic Database:** Implementing a real time WMS can considerably reduce paper work as all records can be maintained electronically. Further, past data would be extremely useful in predicting the buffer space requirements for a particular year once information regarding the monsoon is available. This would also help finalize plans on the capacity to be immediately added by hiring extra godowns.
- **Agro-marketing centres:** Centralizing operations at least at the division level would enable KSWC to create agro-marketing centres at main locations in its divisions; WMS will facilitate real time monitoring of commodities i.e. the stage of processing—be it grading, sorting, labeling, storage etc. at central and warehouse level. Such real time updates of data will help in co-ordination with the suppliers and buyers at multiple locations in an efficient manner from one location.
- **Automated Report Generation:** WMS system can also be customized to generate reports, if certain processes are not being followed, they can be monitored at the central level.
- **NCDEX accreditation:** Accreditation of warehouses from NCDEX is possible only when a WMS system is in place. This could be a potential diversification path for KSWC in the future.

Moreover, with storage capacity at the warehouses increasing every year the present manual system of entry would simply become unsustainable beyond a point. Therefore, it is imperative that while expansion of storage initiatives are on, KSWC starts creating an information backbone to carry out its activities efficiently.

Project Financials:

The capital expenditure has two components- hardware costs and software license costs.

1. The hardware required is taken to be only computer terminals. The cost of a computer terminal is taken as INR 40,000. A minimum of 1 computer is required for each warehouse. Further, if a warehouse (location) has more than 20 godowns, an extra computer terminal would be required.
2. After consultations with various WMS vendors, the license cost for each location has been taken as INR 10 Lac. The cost of the central server license has been taken as INR 25 Lac. The software license is an Intellectual Property owned by the WMS vendors. The license cost charged to the client includes a 60% mark-up on the following costs.
 - Research and development costs for developing the software.
 - Cost of carrying out detailed studies to find out customization required.
 - Customization costs of the WMS software

Total capital expenditure to be incurred by the private partner for implementing WMS in all the 17 warehouses together by a single private partner is INR 166 Lac.

Since the capital investment required is small when compared to other projects on PPP in infrastructure, a capital structure of 100% equity has been assumed for the project. The weighted average cost of capital is taken to be 20%.

Operating expenses for the project have been marked up at specific rates to get the expected annual payments from the Government. These rates have been arrived at after detailed consultations with various WMS vendors. The annuity payments from the Government would alone be the source of revenue for the private partner.

The annuity payments are expected to increase by 8% each year to adjust for cost escalation in the following components of operating expenses borne by the private partner.

- Maintenance costs of the WMS software
- Salary expenses (WMS operators, data entry operators and support software engineers)
- Boarding and lodging expenses of the employees
- Training expenses incurred for conducting workshops for KSWC employees.

The NPV of annuity payments over the license period that the government has to pay the private partner to ensure an IRR of ~23 % are given below.

Cluster	NPV of annuity payments (INR Lac)
Cluster I	214.59
Cluster II	179.31

Cluster III	159.39
All clusters with different project partners	553.49
All clusters with the same project partner	482.92

It can be seen that the government would save INR 70 Lac in terms of payments it makes to the private partner when all the three clusters of warehouses are taken up a single partner for implementation of WMS. This saving can be attributed to the fact that each private partner would need to be compensated for a server license when three partners exist. Therefore, it is recommended that one qualified WMS vendor takes up the entire project.

Statutory and Legal Framework:

With regard to the policies to be followed by the KSWC, the Warehousing Corporations Act stipulates that the Board of directors shall act on business principles having regard to public interest and shall be guided by such instruction on questions of policy as may be given to them by the State Government or the Central Warehousing Corporation.

The Warehousing Corporations Act of 1962, while mentioning the terms and conditions for issue, renewal and suspensions of licenses, does not prohibit any initiatives by the KSWC to be taken up under Public Private Partnerships (PPP).

Indicative environmental and social impacts:

The implementation of WMS in KSWC warehouses has no visible environmental impact.

Implementation of Warehouse Management Systems in the state warehouses would streamline the movement of food-grains from the producers (farmers) to the consumers (market) either directly or through the Government (PDS scheme).

This would help the government forecast storage space requirements in the state, during extreme conditions of bumper harvest and drought.

Therefore, the entire project would bring about efficiencies in storing agricultural commodities and allow the warehouses to become terminal agro-market centres in the long run by facilitating real time monitoring of commodities at central and warehouse level. This would help in co-ordinating among the suppliers and buyers, immensely benefitting farmers and consumers across the state.

Operating framework:

The potential risks and mitigation measures for the PPP project are outlined below.

Risks	Mitigation measures
Delay in implementation and roll-out of WMS across the 17 identified warehouses	Strong Service Level Agreements specifying timeframe for each phase need to be signed with the private partner.
Piracy of installed software	Only qualified WMS vendors having well-defined valid IPs for their licenses need to be allowed for bidding. Such measures should be a part of contractual obligation of the vendor.
Delay in annuity payments from the Government	An escrow account where an independent trusted third party receives and disburses money and/or documents for the transacting parties needs to be in place. The timing of such disbursements by the third party would be dependent on the fulfillment of contractually-agreed conditions by the private partner and KSWC.
Resistance by KSWC employees for the project, leading to a non-conducive working environment for operators provided by private partner	Measures to sensitize KSWC employees are required. KSWC would need to convince its employees on the benefits of WMS, making it clear that it would supplement rather than substitute human capital requirements.

Project Structure:

An indicative project structure is given below.

Component	Description
Structure	<ul style="list-style-type: none"> • PPP project, annuity model. • Private partner owns hardware during license period, sells it to KSWC at the end of five years. • WMS vendor quoting the lowest annuity bid gets the project. • WMS vendor maintains and operates the software, provides other services at the 17 warehouses during the entire license period.
License Period	<ul style="list-style-type: none"> • 5 years

Component	Description
Payment from Concession Authority	<ul style="list-style-type: none"> • Predetermined annuity payments. • Total base year annuity amount to be quoted by bidder • Annuity increases by 8% every year. • Annuity components include software license and maintenance cost, operators' salaries and boarding and lodging expenses, salary of software engineers, migration of 3 year transaction data to WMS, training KSWC employees on WMS.
Role of Concession Authority	<ul style="list-style-type: none"> • KSWC provides a central server to host the WMS license. • KSWC ensures that internet connectivity is provided to the 17 warehouses identified for WMS roll-out. • Data to be migrated to WMS is provided as per the pre-format suggested by the vendor.
Role of Private Partner	<ul style="list-style-type: none"> • Understand the customization required for KSWC in core WMS; responsible for implementation and roll-out across 17 warehouses within a period mentioned in the tender. • Provide operators and software engineers to maintain and operate the WMS at the 17 warehouses for the license period. • Provide data entry operators to migrate data in the suggested pre-format to WMS software. • Arrange workshops once every 2 months for KSWC employees for training them on WMS.

Way ahead

The immediate milestone for the Project would be

- Preparation of Tender Documents for Selection of Transaction Advisor for the Project

Tender documents will be prepared for selection of Transaction Advisors which would include the following:

- Detailed Scope of Work including deliverables and timelines for submission.
- Outlining the minimum eligibility criteria, which the bidders would necessarily have to meet before their bids are evaluated in detail.
- Description of Evaluation process elaborating the various evaluation parameters and their respective weightages.

The transaction advisor would come up with a draft Agreement which would spell out the following:

- The Obligations and Scope of Work for the private partner.
- Progress Reporting Mechanism.
- Dispute Resolution Mechanisms.
- Termination of Contracts by either of the parties.
- Defining conditions and events leading up to a default in obligations.
- Conditions construing Force Majeure
- Conditions leading up to a termination of Contract and invoking of the Performance Guarantee.
- Strong specific Service Level Agreements mentioning timeframes for all services that are a part of the contract with the private partner.

Capacity Building Workshops will be conducted for officials who are identified as PPP Cell personnel by the department.

Recommendations

Keeping in mind the nature of the project, the following recommendations are made.

- KSWC should go for WMS implementation in the 17 warehouses identified, as it will bring with it a host of benefits including efficiency in operations that will improve service delivery to end users
- A single private player for implementation and roll-out of the project in all 17 warehouses is preferable. As per the analysis done by the Consultant, the overall cost of the WMS to the Government will be ~13 % lesser in this scenario than in the situation where each cluster is given to a separate player
 - Operationally too, it is easier to work with one central server license rather than integrating 3 server licenses together.
- It is necessary that the transaction advisor chosen for this project has sufficient expertise in the field of IT. This will ensure that deliverables and other requirements are clearly defined and leave no scope for ambiguity.

2 Introduction

Karnataka’s competitiveness from a natural and human resources standpoint makes it the destination of choice for investors. Making use of this, Government of Karnataka (GoK) envisages development of infrastructure across various sectors in the state through Public Private Partnership (PPP) projects.

The Infrastructure Development Department (IDD) of Government of Karnataka has selected consultants for Sector Specific Inventory & Institutional Strengthening for mainstreaming of PPP for various departments related to infrastructure development in the state. Feedback Infrastructure Services Private Limited (FISPL) was selected to assist Infrastructure Development Department (IDD) to fulfill the above objective.

The Inception Report, comprising of preliminary information on the sectors covered under Infrastructure Development Department (IDD) and the inventory of the projects finalized in consultation with IDD, was submitted by the consultants on February 22, 2012. The figure below summarizes the progress of the assignment, in reference to the defined objectives.

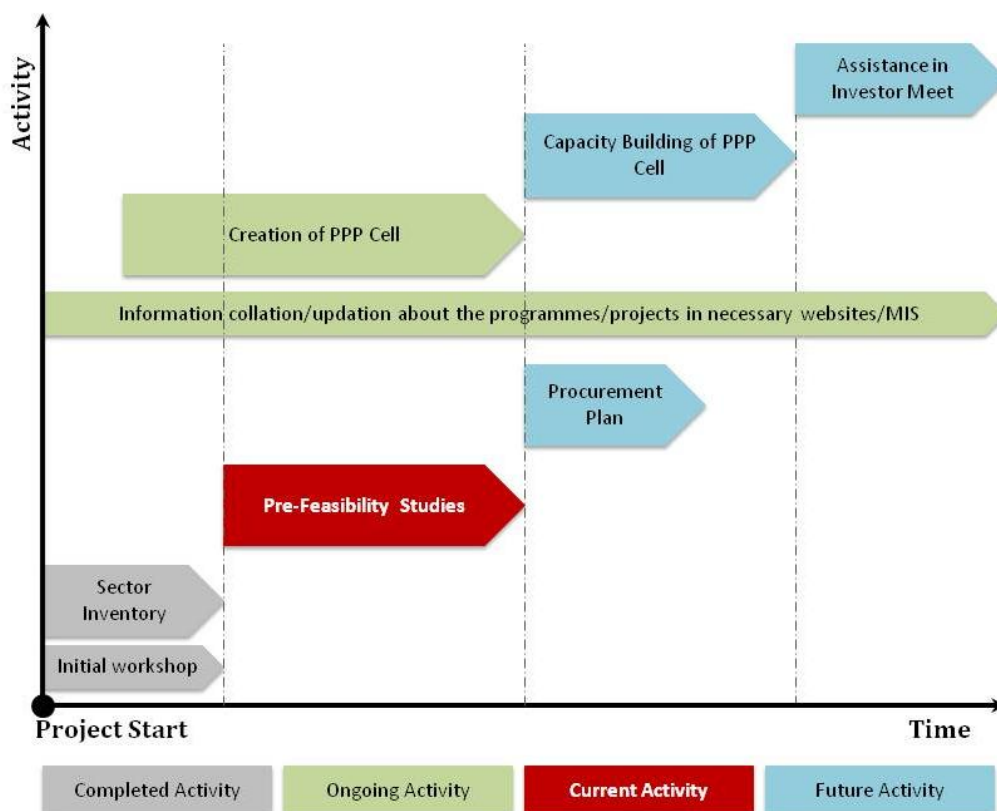


Figure 1: Project Status

The report details out the prefeasibility study done for 'Development of Warehouse Management Systems in Karnataka State Warehousing Corporation'. 17 sites were finalized in consultation with IDD and Karnataka State Warehousing Corporation.

2.1 Structure of the Report

This project report has been structured along the following in a chapter-wise format.

Chapter 2: Introduction

The chapter includes the background of the project and introduction about the study that is being undertaken.

Chapter 3: Warehouses in Karnataka and the need for WMS

The chapter includes details of various warehouses in Karnataka and prior PPP initiatives of the KSWC.

Chapter 4: Project Detail

The chapter includes the details and description of the project and project components. The best Case Studies have been reviewed in this chapter and relevant points have been applied in the design of the project in focus.

Chapter 5: Market Assessment

The chapter details out the necessity for warehouses in Karnataka to implement Warehouse Management Systems and the possible types of companies that would be interested in the PPP initiative.

Chapter 6: Project Financials

Based on market assessment and project details, financial parameters for the project have been calculated. The chapter includes the cost & revenue assessment and the projected tariff rate for the project facilities. Thus a project viability report has been prepared to assess the funding requirement for the project.

Chapter 7: Statutory & Legal Framework

Based on the above analysis a legal & regulatory framework has been developed for the project.

Chapter 8: Indicative environmental and social impacts

This chapter specifies the possible environmental and social impacts of the WMS project.

Chapter 9: Operating Framework

The Chapter covers risk assessment for the project & mitigation measures for the same. An indicative project structure has been prepared for the development of the project

Chapter 10: Way Ahead

The chapter includes the procurement plan timelines for further development of the project.

2.2 Approach & Methodology

The approach and methodology adopted for the study is as outlined in the figure below.

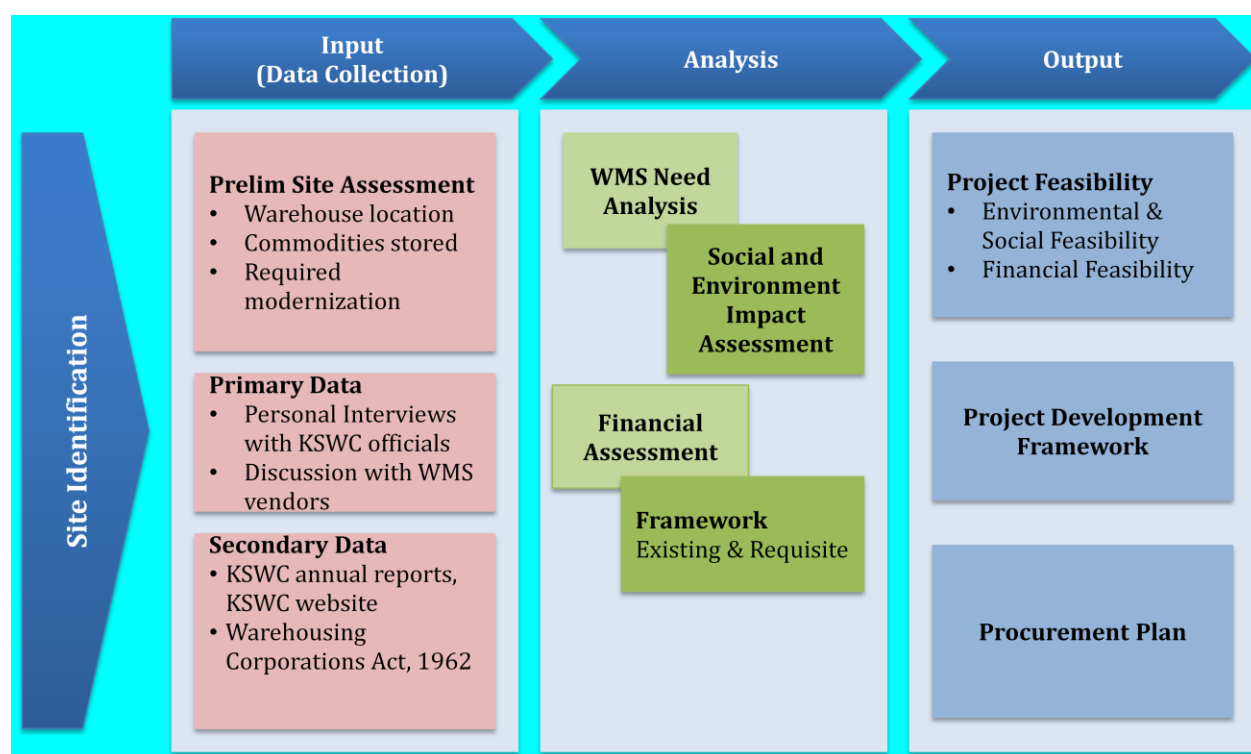


Figure 2: Methodology for the study

Stage I: Input

The first stage involved the study of the project site to understand its suitability for the defined activity. Various factors influencing the need for the proposed project were analysed.

Simultaneously, this stage also involved collection of data, both primary and secondary, to carry out the requisite financial assessment in later stages.

Stage II: Analysis

This stage involved review and analysis of data, collected in the previous stages, in order to assess the financial feasibility of the project, as well as its environmental & social impacts.

This stage also involved assessment of the legal and statutory framework along with identification of issues and mitigation measures.

Stage III: Output

Based upon the results of the analysis, the final stage defines the framework and the procurement plan for further development of the project.

3 Sector Profile

3.1 Industry Overview

Logistics is a significant part of economy, accounting for 8-10% of Indian national GDP. Logistics costs include cost of transport by various modes, warehousing and storage activities, consolidation/deconsolidation activities and database management. Transportation and storage costs contributes significantly to the total logistics cost.

India is ranked 47th on the World Logistics Performance Indicator 2011, indicating that India's logistics infrastructure is still at a developing stage and a lot needs to be done to improve its efficiency. According to a CRISIL research report that forecasts the logistics scenario for the five year period from 2009-10 to 2013-14, the logistics industry in India is pegged to grow at around 11 per cent CAGR and is expected to reach INR 4.6 trillion in 2013-14

Logistics includes two major components:

a) Transportation

Transportation has the largest share in the overall logistics cost. Transportation is required at each step in the entire logistics supply chain.

An efficient and well-connected network of roads, railway lines, ports and airports is pivotal for the development of the transport sector.

b) Storage

There are various stages at which storage of goods is required in the logistics supply chain. Storage spaces also work as the nodal centres for consolidation, stuffing and de-stuffing of bulk material to be transported further. Similarly, to provide efficient and quick supply to various regions, storage is required at various levels.

Warehouses are commercial buildings for storage of goods used by manufacturers, importers, exporters, wholesalers, transport business and customs. Warehouses usually have loading docks to load and unload goods from trucks, sometimes directly from railways, airports, or seaports.

3.2 Warehousing in India

According to Cargotalk, a leading South Asian cargo monthly magazine, India has a total warehousing space of 1.8 billion square feet out of which 8% (around 144 million square feet) is in the organized sector. This paucity of warehousing space results in a colossal waste of farm output.

For the manufacturing sector, warehousing plays a crucial role in bridging demand supply gaps and keeps a check on the time required for a product to reach the consumer. Technologically enabled state-of-the-art warehouses with proper support infrastructure and trained manpower maintain product sanctity, reduce cost and improve overall efficiency. With the imminent

implementation of the GST, a shift towards large mother warehouses with superior technology and infrastructure to feed distribution centers is expected.

Warehousing sector in India is dominated by small unorganized sector players. One of the main players in the organized sector is the public sector Central Warehousing Corporation (CWC), which operates 464 warehouses across the country. Having a storage capacity of 100 million tonnes, the CWC provides warehousing services for a wide range of products ranging from agricultural produce to sophisticated industrial goods. Its warehousing activities range from food-grain warehousing and industrial warehousing to custom bonded warehousing, container-freight stations, inland clearance depots and air-cargo complexes. Voice technology (to enable workers to communicate with warehouse management systems using speech analysis) and RFID technology have simplified warehouse distribution operations to a large extent.

3.3 Karnataka State Warehousing Corporation (KSWC)

While CWC dominates warehousing sector at the central level, at state level it is the state warehousing corporations that have extensive warehouse networks. In Karnataka, KSWC was established in November 1957 under the Agricultural Produce (Development and Warehousing) Corporations Act 1956 later repealed by the Warehousing Corporations Act 1962. With 123 warehouses and 446 employees on its rolls, the total storage capacity in owned and hired godowns for KSWC was around 9.59 Lac metric tons as of January 2011. The CWC and the state government each have 50% stake in KSWC, having contributed INR 3.9 crores apiece as paid-up capital. Further, the state warehousing corporation has consistently been a profit making entity over the past decade.

Scientific storage facilities for food grains, pulses, oilseeds, spices, sugar, fertilizer, manure and other notified commodities through a network of 120 Warehouse centres throughout Karnataka are provided for by KSWC. The beneficiaries mainly include local depositors like farmers, traders, merchants and bulk depositors like Food Corporation of India, fertilizer companies, sugar factories and other government organizations.

The Corporation, apart from storage facilities also provides for handling and transportation of stocks to and from the warehouse centres to its major bulk depositors. Keeping in view the demand for storage, the Corporation constructs additional godowns and adds capacity every year.

The objectives of KSWC are outlined below.

- To acquire and build godowns and Warehouses within the state of Karnataka.
- To run Warehouses in the state for the storage of Agricultural Produce, Seeds, Manures, Fertilizers, Agriculture implements and other notified commodities.
- To arrange facilities for the Transport of Agricultural Produce, seeds Manures, Fertilizers etc.

- To arrange for Disinfestations service to the farmers, Government offices, Public libraries, Hostels, Theaters, Public buildings, Private establishments, Apartments etc., Rodent control, Insect control, Cockroach control are a few specialized services undertaken.

3.4 Agriculture in Karnataka

As the state warehousing corporation's prime objective is to provide storage facilities to the agricultural sector, it is important to look at the agricultural profile of the state. In fact, the agricultural profile in various regions of Karnataka also governs the kind of commodities being handled at KSWC warehouses located there.

Karnataka's soil conditions and climate jointly contribute in growing crops in the state. Agriculture as an occupation covers 12.31 million hectares of land which is 64.6 percent of the total area. In 2008-09, Karnataka produced 99.71 Lac tones of cereal, 307 Lac bales of cotton and 130.26 Lac tones of horticulture crops. Karnataka ranks fourth in the country in terms of sugarcane production with 221.86 Lac tons of sugarcane production in 2008-09.

Pulses, being rich sources of proteins occupy an important place in the state's agricultural economy and constitute 10 to 15 per cent of India's food grain diet. In Karnataka, Red-gram, the dominant pulse, is grown in an area of 475,396 ha (production of 2.96 Lac tonnes) mainly in the northern parts of the state including Gulbarga and Raichur districts.

3.5 PPP Initiatives in Warehousing-Private Entrepreneurs Godowns Scheme 2008

In 2008, due to the increased procurement of food-grains the Food Corporation of India (FCI) formulated a scheme for construction of storage godowns for Central Warehousing Corporation (CWC) and State Warehousing Corporations (SWCs) through the involvement of private entrepreneurs.

Under this scheme, tenders have been invited from land-owners or those who hold land under lease for at least 13 years to construct godowns to satisfy FCI storage requirements. The minimum land area required for storing the first 5000 tonnes is 2 acres; for every additional 5000 tonnes of storage, an extra 1.7 acres would be needed.

The scheme specifies guaranteed lease payments from FCI to the private partner for a period of 10 years in return for constructing and operating the godowns. The project is to be developed on a Build, Own & Operate (Lease, Preservation and Maintenance) (BOO) basis.

Assessment of additional storage needs under the scheme is based on the overall procurement/consumption and the storage space already available.

Under this scheme, creation of 416,500 metric tons of storage space has been ear-marked for the state of Karnataka.

The implementation of the scheme in the state has been through 3 phases. Phase 1 covers an addition of 37500 MTs to the storage capacity at Hassan, Bagalkot, Belgaum and Mandya. Phase 2 envisages addition of 60250 MTs in the warehouses at Mysore-III, Chitradurga, Harihara, Raichur-II and Chikamagalur. Phase 3 targets an addition of 41000 MTs at Chamarajnagar and Bagalkot. The table below shows the progress of the scheme in the state.

Table 1: Progress of KSWC projects under PEG-2008 Scheme as on October 2011

Centre	Capacity (Tons)	Commencement of construction	Completion	Physical progress
Bagalkot	6500	27/4/2011	26/1/2012	Footing work under progress
Belgaum	10000	10/5/2011	9/2/2012	Plinth level and PEB erection works under progress
Hassan	4500	5/5/2011	4/2/2012	Column upto Basement under progress
Hassan	1600	5/5/2011	4/2/2012	Brick work under progress
Hassan	2900	5/5/2011	4/2/2012	Roof Level
Mandya/ Maddur	6500	5/5/2011	4/2/2012	Column & SSM works under progress
Mandya/ Maddur	5500	5/5/2011	4/2/2012	Column & SSM works under progress
Chitradurga	10000	4/7/2011	3/7/2012	Column, Plinth Beam, Grade Beam & BBM works under progress
Chitradurga	600	14/7/2011	13/7/2012	Earth work, footing, Grade Beam, Skin wall work under progress

Chitradurga	4000	14/7/2011	13/7/2012	Earth work excavation Under progress
Chitradurga	3400	14/7/2011	13/7/2012	Footing, Pedestal, Plinth beam works under progress
Mysore- III	4000	14/7/2011	13/4/2012	Column works under progress
Mysore- III	4000	14/7/2011	13/4/2012	Lowering & levelling works under progress
Mysore- III	5000	14/7/2011	13/4/2012	Lowering & levelling works under progress
Chikamagalur	3400	29/7/2011	28/7/2012	Footing under progress
Chikamagalur	4600	25/03/2011	24/03/2012	Lintel Level
Harihara	3800	4/7/2011	3/4/2012	Plinth Beam works under progress
Harihara	2700	4/7/2011	3/4/2012	Plinth Beam works under progress
Raichur – II	2750	5/4/2011	4/1/2012	Basement completed, Column work under progress
Raichur – II	3000	5/4/2011	4/1/2012	Column upto 1st lintel completed, BBM Under progress
Chamarajnaragar	25,000	3/10/2011	2/10/2012	Levelling & lowering work under progress

4 Project

4.1 Description of the Project

Even though Karnataka has 123 warehouses across the state, the warehouses are basic storage spaces. Given the large scale of operations, there is a need for an integrated approach to managing these warehouses to streamline operations and also monitor the activities at all warehouses from a central level on a real time basis. In the modern warehousing scenario, Warehouse Management Systems play a pivotal role in integrating the functioning of scattered warehouses and aiding in efficient operations for the managing agency as a whole.

In this context, it was decided to explore the option of rolling out Warehouse Management System for KSWC warehouses on a pilot basis for 17 warehouses. These warehouses were selected in consultation with KSWC, with large warehouses being taken up for the pilot project.

As KSWC has the crucial role of making space available for food grains for Public Distribution System, it would be difficult for it to give operations in the hands of private player. Hence, the WMS project can be given as a PPP project on management contract basis with the private player getting an annuity payment to cover the cost of services provided. The bidding can be on the basis of quoted annuity payments. The services to be provided, and the advantages that the WMS system will bring, will be explained in detail later.

The consultants have divided the 17 warehouses into 3 clusters based on geographical location of the warehouses. Cluster I covers the northern regions of the state, cluster II consists of warehouses in the central region and cluster III consists of warehouses in the southern part of Karnataka.

Table 2: Warehouse clusters for WMS implementation

Cluster I	Cluster II	Cluster III
Gulbarga-I	Raichur-I	Koralur
Gulbarga-II	Raichur-II	Tumkur -II
Bidar	Sindhanur	Mysore-III
Bijapur-II	Hospet	Hassan
Bagalkote	Machenahalli	Mandya
Gadag	Chitradurga	

This section gives brief profiles of the regions where the clusters of warehouses are located. As KSWC warehouses mainly handle agricultural commodities, the agricultural profiles of these regions are discussed to give an idea of kind of commodities that are expected to be stored in the respective regions.

The table below summarizes the major crops grown in the districts where the 17 warehouses are located.

Table 3: District-wise crops grown

Cluster	District	Major crops
Cluster I	Gulbarga	Tur, pulses, sugarcane and cotton
	Bidar	Jowar, wheat, pulses, oilseeds and sugarcane
	Bijapur	Jowar, wheat, Bengal-gram and sugarcane
	Dharwad	Paddy, maize, tur and Bengal-gram
Cluster II	Raichur	Rice, jowar, sunflower and groundnut
	Shimoga	Paddy
	Chitradurga	Maize, jowar, ragi and bajra
Cluster III	Mysore	Rice, maize, jowar and ragi
	Hassan	Ragi, paddy, wheat, jowar and pulses
	Mandya	Ragi
	Tumkur	Ragi, groundnut, paddy

Cluster I

Cluster I warehouses - Gulbarga-I, Gulbarga-II, Bidar and Bijapur-II in Gulbarga region and Bagalkote and Gadag in Hubli region are located in the northern parts of the state. The warehouses identified come under Gulbarga (Gulbarga-I and Gulbarga-II), Bidar (Bidar), Bijapur (Bijapur –II) and Dharwad (Bagalkote and Gadag) districts.

Agriculture in Gulbarga district is a moderately developed economic activity. The district is known as the ‘Tur Basket of the State’ and has major concentration in cultivation of pulses. Sugarcane and cotton are the other thrust areas in the district.

Dharwad district has a high potential for agriculture and allied industries with the presence of 3 agro-climatic zones, high end research based agriculture universities and testing labs. There is immense scope for enhancing productivity and organic farming for all kinds of crops.

Bidar, the northernmost district in the state is known as the ‘Pulse Bowl’ of Karnataka with 51% of total cultivable land being used for growing pulses. Average farm size in the district is quite high, around 1.63 ha per family. Jowar and wheat are the major cereals grown in the district. Black gram, Bengal gram, Green gram and Red gram are the major pulses grown in the district.

Groundnut, Sunflower, Soybean, Safflower, Sesame are the major oilseeds. Sugarcane is the major commercial crop.

In Bijapur district, jowar, wheat, Black gram, Bengal gram, Green gram and Red gram are major cereals and pulses grown in the district. Again, sugarcane is the major commercial crop. The per capita availability of cultivable land is one of the highest at around 3.2 ha per capital. The region falls under northern dry zone of the agro climatic classification.

Cluster II

Cluster II warehouses – Raichur-I, Raichur-II, Sindhanur, Hospet (Raichur region), Chitradurga (Davanagere region) and Machenahalli (Shimoga region) fall in the central regions of the state. These warehouses are located in Raichur (Raichur-I, Raichur-II, Sindhanur), Bellary (Hospet), Chitradurga (Chitradurga) and Shimoga (Machenahalli) districts.

Agriculture in Raichur district is a moderately developed economic activity with the major area of concentration being improvement in productivity of the crops and subsequent expansion of area under production.

The major crops cultivated in Chitradurga are maize, ragi, jowar, bajra and minor millets such as Red gram, cowpea, Green gram, groundnut and sunflower. Castor and cotton are the important commercial crops. The potential for improving agricultural productivity in the region is enormous.

Agriculture-wise Bellary is one of the least affluent areas of the state. Increased mining and industrialization has led to decrease in the cultivable land in this district. The focus in this district is to revitalize the sector and create forward and backward linkages.

Paddy is the major crop grown in Shimoga district, being cultivated on 66% of the total agricultural area. Area under pulses and oilseeds is very low and can be greatly increased by crop diversification. Considering water availability and soil suitability, there is scope for introducing high value crops along with food processing units.

Cluster III

Cluster III consists of warehouses –Mysore-III, Mandya, Hassan (Mysore region), Koralur and Tumkur-II (Bangalore region) - in the southern part of the state. These warehouses are located in Hassan (Hassan), Mandya (Mandya), Mysore (Mysore – III) and Bangalore districts.

Agriculture in Mysore district is a well-developed economic activity with rice, maize, jowar, ragi, cowpeas, pulses, oilseeds & cotton the major agricultural crops in the region. The district has been also identified for setting up organic villages with export oriented cultivation.

Hassan district has total 3,93,500 Hectares of land under cultivation with the share of irrigated area being only 20% of total area. Cereals, chiefly ragi, paddy, wheat and jowar and pulses are the major crops grown in the district. The thrust areas in agriculture currently include, monitoring timely availability of agricultural inputs to the farmers, ensuring timely credit facility, and timely suggestions through mass media.

In Mandya district area under agriculture is 0.25 million hectares, with a total of 48% under irrigation. 92% of the farmers in the district are small and marginal land-owners. Cereals, mainly ragi, are the main crops grown in the district.

Agriculture is a moderately developed industry in Tumkur. Ragi and groundnut are the major crops of the district. About 30 percent of the area previously under cereals has been diverted to oilseeds. Hybrids in paddy are the ruling varieties in the district. Area under Maize has been increasing every year.

A table showing the average storage capacity, occupancy and loans availed by depositors by pledging warehouse receipts in the 17 warehouses are detailed below.

Table 4: Capacity, occupancy and loans availed at the 17 warehouses identified for WMS roll-out

Centre	Average capacity owned and hired (Tons)	Occupancy including reservation(Tons)	Average % occupancy	Loans availed by depositors (In INR Crores)
Gulbarga-I	39228	32607	83.12	69.25
Gulbarga-II	61929	48212	77.85	89.07
Bidar	48435	46353	95.70	29.80
Bijapur-II	17600	15421	87.62	2.40
Bagalkote	12000	9793	81.61	7.70
Gadag	8295	5549	66.89	4.18
Raichur-I	38914	29240	75.14	12.51
Raichur-II	20960	14650	69.89	4.98
Sindhanur	28144	23335	82.91	14.66
Hospet	24346	18140	74.51	0.35
Machenahalli	14309	16375	114.44	1.12

Chitradurga	14905	14862	100.39	0
Koralur	33000	31655	95.92	0
Tumkur -II	16167	14127	87.38	6.38
Mysore-III	15000	14006	93.37	1.60
Hassan	44801	37260	83.17	1.70
Mandya	28931	25812	89.22	9.33
Total (121 warehouses across the state)	1163873	919217	78.89	519.44

It can be seen that the average occupancy levels are more than 80% in most of the warehouses, which indicate that the warehouses are full throughout the year and would require efficient means for allocating space to new consignments being brought in for storage.

Details of the business turnover at the 17 warehouses during the financial year 2010-2011 are given below. It can be seen that these warehouses are among the largest ones in each region and on an average, have a huge turn-over rate.

Table 5: Business turnover during 2010-11

Centre	No. of Godowns	Share of deposits in total deposits across 121 warehouses	Share of total Withdrawals in total withdrawal across 121 warehouses
Gulbarga-I	25	5.76%	5.70%
Gulbarga-II	38	5.30%	4.62%
Bidar	24	6.26%	5.78%
Bijapur-II	4	3.18%	2.71%
Bagalkote	8	0.96%	0.92%
Gadag	3	0.61%	0.64%
Raichur-I	29	2.34%	2.28%
Raichur-II	19	1.20%	1.12%
Sindhanur	14	1.50%	1.51%
Hospet	5	0.46%	1.15%
Machenahalli	3	1.19%	1.24%

Chitradurga	12	2.98%	3.22%
Koralur	6	6.97%	5.90%
Tumkur -II	6	1.80%	1.77%
Mysore-III	5	2.45%	1.99%
Hassan	29	9.44%	8.52%
Mandya	11	3.96%	3.56%
Total (17 warehouses)	241	56.32%	52.18%

From the above two tables, it is observed that these 17 warehouses together account for 40% of the storage capacity of KSWC warehouses across the state. Further, these 17 warehouses alone contributed to 56.32% of the total deposits and 52.18% of the total withdrawals across all warehouses in the state during the financial year 2010-2011.

It can be further inferred that on an average, 200 metric tons of commodities are deposited and 160 metric tons withdrawn every day at these warehouses. Hence, given the storage capacity and the large transactions that take place at these warehouses every day, it is important that a warehouse management system is in place to streamline the processes.

4.2 Best Case Studies for similar projects in India

There are no prior examples of implementation of Warehouse Management System on PPP basis across warehouses on this scale in any of the state warehousing corporations. However, there are cases in e-governance on PPP basis where the software provider is a service partner. One such successful initiative is the establishment of Passport Seva Kendras across the country and upgrade of existing passport offices in partnership with a private player.

4.2.1 Passport Seva Kendras in India – A PPP initiative

Faced by an exponential demand for passports since 2002 in an extremely bureaucratic environment where the entire process of obtaining passports was tedious and time-consuming for citizens, the Ministry of External Affairs decided to outsource passport processing in year 2008. Tata Consultancy Services, Wipro, 3i infotech, Spanco, ECIL and BEL were the pre-qualifiers. TCS bid the lowest amount per passport (INR 200).

Project Structure

The project was structured in such a manner that all processing work related to issuance of passports including police verification is expected to be done through TCS with printing of passports alone to be done by MEA. The project envisaged upgrading the existing 37 passport offices and acting as service partner in 77 new passport offices.

The suite of services to be offered by the selected private partner included development and roll out of software for provision of passports in 3 days, provision of technology backbone, training and providing call center services. The private player would, in return, get a specified amount for each passport issued. The amount asked for issuance of each passport was the bid variable.

With the demand for passports expected to touch 10 million passports a year by 2015, total worth of the deal supposed to be around 10 billion rupees for complete end-to-end maintenance. The PPP also made it mandatory for process and delivery of passports in 3 working days by the authorities with Tatkaal passports delivered on the same day.

On the whole, the entire project was in the fore-front of a technology-led, service oriented approach to issue and renewal of passports simultaneously ensuring security, safety and maintenance of safe-guards and proving to be of immense value to the citizens.

The partnership enabled digitizing passport services and online filing of passport applications. With citizens able to submit details online and make appointments for submission of required documents at the Passport Seva Kendras, the long queues at the Regional Passport Offices were expected to come down.

Benefits to TCS

The size and complexity of the project made the PPP a very lucrative for TCS. In a way, it was an affirmation of the company's standing as the biggest IT player in the industry.

Further, various aspects of the deal were seen as precursors towards similar projects that featured implementation of e-governance in developing countries. There was a potentially huge opportunity for the company to learn from experience and implementing similar projects in overseas markets.

Besides, the project would help achieve corporate social responsibility objectives and would reinforce meaningful and valuable contributions of the Tata group to the Indian society.

Actual implementation

The project went live in June 2009 having been delayed by a year due to glitches in the software developed by TCS to process passports.

Initially, the roll-out was characterized by complete chaos caused by slow servers and unsatisfactory grievance redressal forums. This resulted in TCS being fined INR 48 Lac by MEA for delay and problems in implementation.

However, after subsequent stabilization of the system, in 6 months 70 of the 77 proposed Passport Seva Kendras became operational (as of April 2012). Given the success till date, PSKs are expected to deal with demand of 1 crore passports per year in 2015 easily.

Furthermore, the success of the project has meant that Indian embassies worldwide would be integrated with Passport Seva Kendras soon.

4.2.2 Issue of smart cards by RTOs in Karnataka

One of the biggest revenue-earners for the State with revenue of more than INR 1,800 crores per year, the Transport department in Karnataka through its 57 Regional Transport offices across the state is mainly responsible for issuing licenses, registration of new vehicles, collection of motor vehicle taxes and fines, issuing permits, recording fitness of vehicles. Therefore, these RTOs hold, maintain and process large volumes of data annually.

By 2008, RTOs in Karnataka had issued 65 Lac driving licenses and registration certificates to 76 Lac vehicles.

Structure of the project

The tender for the project was floated in 2008. It set out the method for identifying the winning bid as follows:

- Bidders needed to specify the price per issued smart card. The overall quoted price was to be arrived at after including the prices specified by a bidder for a driving license smart card and a vehicle registration certificate smart card. The weights assigned to driving license smart card and vehicle registration smart cards were 0.4 and 0.6 respectively.
- The bidder with the lowest weighted quoted price per smart card was to be awarded the project.

The winning bidder was a consortium of 3 companies- Rosemarta Technology, Mynd Solutions and Team Computers. The bid quoted by the winner was INR 49 for a driving license smart card and INR 63 for a vehicle registration smart card.

Under the terms of the project, the private partner had to provide all the necessary hardware including Computer Terminals, UPS, Servers, Printers, Smart Card facilities and support facilities at all the 57 offices.

The completion of the project was to be marked by the private player issuing 1 crore smart card Driving Licenses and 1 crore vehicle RC books or issuing smart cards for a period of 15 years, whichever is earlier. Further, the Smart Card fee of INR 200, levied for each smart card could not be changed by private partner under any circumstance, unless the Transport Department itself notified a change in law or statutory provisions.

Insurance cover to the drivers needed to be provided by the private partner from a reputed insurance company to incentivize citizens to switch to smart card licenses immediately. The private partner was also responsible for technical assistance, and providing data entry operators & personnel for maintenance of the updated software systems.

Finally, the private partner was also supposed to provide training to officers and systems administrators of the Transport Department on operational and functional aspects of the software.

Benefits to the citizens

The project has been structured so that both the private player and the Government could mutually benefit from the association.

For the citizens, it was a step towards efficient, transparent, quick and hassle-free Government services. In fact, the project drew a lot of praise from various sections of the society, for the way this initiative had made the entire process of interacting with Government officials a pleasant one.

Besides smart cards, on an average, cost cheaper than the then existing PVC cards.

Today, these computerization measures further enable citizens to pay Motor Vehicle Taxes anywhere in the state and most importantly have contributed to the elimination of middlemen in RTO offices, making issuance of driving license and vehicle registration a completely transparent one. It has also ensured better accessibility of registration and license data through both web and mobile services. Finally, smart cards have helped in easier transfer of vehicle ownership, with complete information about previous owners of vehicles.

Benefits to the Government

The biggest deliverable through the PPP project for the Government was the possibility of real-time accounting and monitoring of fees and taxes.

It helped the Transport Department gain quick access to vehicle ownerships, fitness certificates and permits. This keeps a check on violations by monitoring of records on traffic violations, convictions and road accidents involving both driver and vehicles.

Through this project, update and maintenance of huge volumes of data has been made easier for officials in the RTOs. Significantly, this goes a long way towards prevention of forgery and manipulation of data in driver licenses and vehicle registration certificates.

Key lessons

- Well defined Service Level Agreements need to be signed with the private partner during a PPP project. Any ambiguity creates hassles for the citizens. The fiasco with TCS during the initial roll-out could have been avoided if the expectations and deliverables in terms of the quality of service required from the private partner were had been clearly mentioned.
- Foresight and accurate knowledge of ground reality is required. In this case, an erroneous assumption that everyone in Bangalore would only file online applications led to the government closing down all other agencies that accepted passports, bringing down processing ability by 50%. This resulted in long queues at the newly opened Passport Seva Kendras during the pilot phase.
- Measures to sensitize Government employees need to be in place. The Union Government here had to deal with protests from the Passport Office employees, allay fears of down-sizing and clarify that Passport Seva Kendras would function independent of the Regional Passport Offices.
- Coordination among stakeholders during design and rollout is pivotal. The government agencies need to work in tandem with the private partners during the roll out stage. A lack of co-ordination between the Government and TCS resulted in passport delivery taking up to 30 days.
- Ensuring that genuine software is installed by the private player at the computer terminals is important. In the PPP between Karnataka RTO and the Rosemerta, it was found that pirated Windows operating systems were installed by the private player. Microsoft made a formal complaint with the Chief Minister of Karnataka in June 2011, when 35 Lac smart cards had already been issued.

4.3 Project Structure

While the above case studies offer valuable lessons for a PPP project that involves mainly technology infrastructure, it will be difficult to replicate the project structure completely for the proposed WMS project.

In the projects described in the case studies above, the private partner was to recover investments in terms of per transaction (per passport/smart card it issued). But in case of the proposed WMS project, the private partner will not be responsible for any of the operational functions of the warehouses where the WMS will be introduced. First, it is difficult to quantify the benefits of WMS in terms of per transaction, as the software system streamlines the operations of the warehouse as a whole. Second, it will be difficult for KSWC to hand over operations to private

players, as it handles goods for Public Distribution System also and giving the rights to operations to a private party can be a sensitive issue.

Thus, it is suggested that the project be implemented on annuity basis, where the private partner recovers its investment through pre-determined annuity payments. The bidding happens on the lowest quoted amount of annuity. The private player will be responsible for the rollout of the WMS software in the warehouses, maintaining it for a specified license period, providing training to the KSWC staff on operation of the WMS software and other support functions that will be specified later.

This is not a new model and has been used extensively in road sector for the ambitious National Highway Development Program. Under this model, the private player invests in providing the requisite infrastructure and in return the government pays an annuity every year. The annuity is decided in a transparent manner through a bidding process.

Further, as this is essentially a project involving roll out of software infrastructure with support services that will be needed only for a few years before KSWC staff becomes familiar with its operations, the concession period is not recommended to be very long. Even in case of TCS Passport Seva Kendra project, once the rollout of software in all the centers is completed, TCS would be responsible for maintenance of the centers for 7 years.

Thus, for the proposed WMS project a total license period of 5 years is considered.

5 Market Assessment

Market assessment generally analyses the demand for a particular infrastructure to be provided on PPP basis. However, in context of this project, the market is limited to Karnataka State Warehousing Corporation. Thus, this section concentrates on dwelling on the need for WMS system for KSWC warehouses by analyzing the benefits such a system will offer.

5.1 Warehouse Management Systems

Before analyzing the benefits that a Warehouse Management System will offer KSWC, it is important to understand the basic features of the system.

Warehouse management deals with receipt, storage and movement of goods, normally finished goods, to intermediate storage locations or to final customer. Through an advanced software program, it tracks movement of a commodity through the supply chain from deposition at the warehouse to allocation of storage space to storage to finally delivery to the final customer. Another advantage of WMS is reduction of paper work. Implementing a real time WMS can considerably reduce paper work as all records can be maintained electronically.

In effect, Warehouse Management System (WMS) programs enable centralized management of tasks such as tracking inventory levels and stock locations. Warehouse Management System has several modules and can be customized as per the requirements of the warehousing entity.

Some major modules include:

- a. **Inventory Management:** Identifies and track inventory at a detailed level to allocate, fill, and deliver orders accurately. The location, condition and amount of goods in all the warehouses can be monitored at one place.
- b. **Slotting and Optimization:** Helps in determining the optimal slot for the Stock keeping Unit based on user defined criteria like size, delivery date, seasonality etc. The criteria can be fine tuned given the past data that gets recorded in the WMS system. Optimal slotting helps in minimizing extra moves by equipment
- c. **Managing Billing and Dispatches:** Records raising of invoice raising with their amount and delivery getting fed into the system. This can be viewed in one go and be used as an effective tool for monitoring operations at various warehouses
- d. **Bar-coding:** Bar-coding is an advanced WMS procedure, whereby all units in the warehouse are assigned barcodes. Scanning of bar codes at each stage of warehouse processing stage automatically feeds the data into the system and updates the system. However, such advanced processes are generally used in retail scenario, where the sales to the end consumers have to be tracked.

Warehouse Management Systems offers several insights to the management. The officials at the decision making level get an instant picture of:

- a. Stock levels and available space in the warehouses from a remote location
- b. Orders being dispatched at any given point of time
- c. Staff Productivity details
- d. Better management of space by efficiently locating items in relation to their receiving, assembly and dispatch points

Presently, deposits and withdrawals in the warehouses owned and hired by KSWC are entered manually. The existing level of computerization in the warehouses across KSWC warehouses is quite low. With only basic storage facilities available as a part of the infrastructure at these warehouses, a lot needs to be done to achieve KSWC's vision to provide scientific storage for the produce, minimize storage losses and prevent volatile market prices of essential commodities. One of the primary steps towards achieving this would be through having Warehouse Management systems.

5.2 Relevance of WMS to KSWC

To understand the benefits WMS will offer KSWC, it is important to first understand how the state warehouses function.

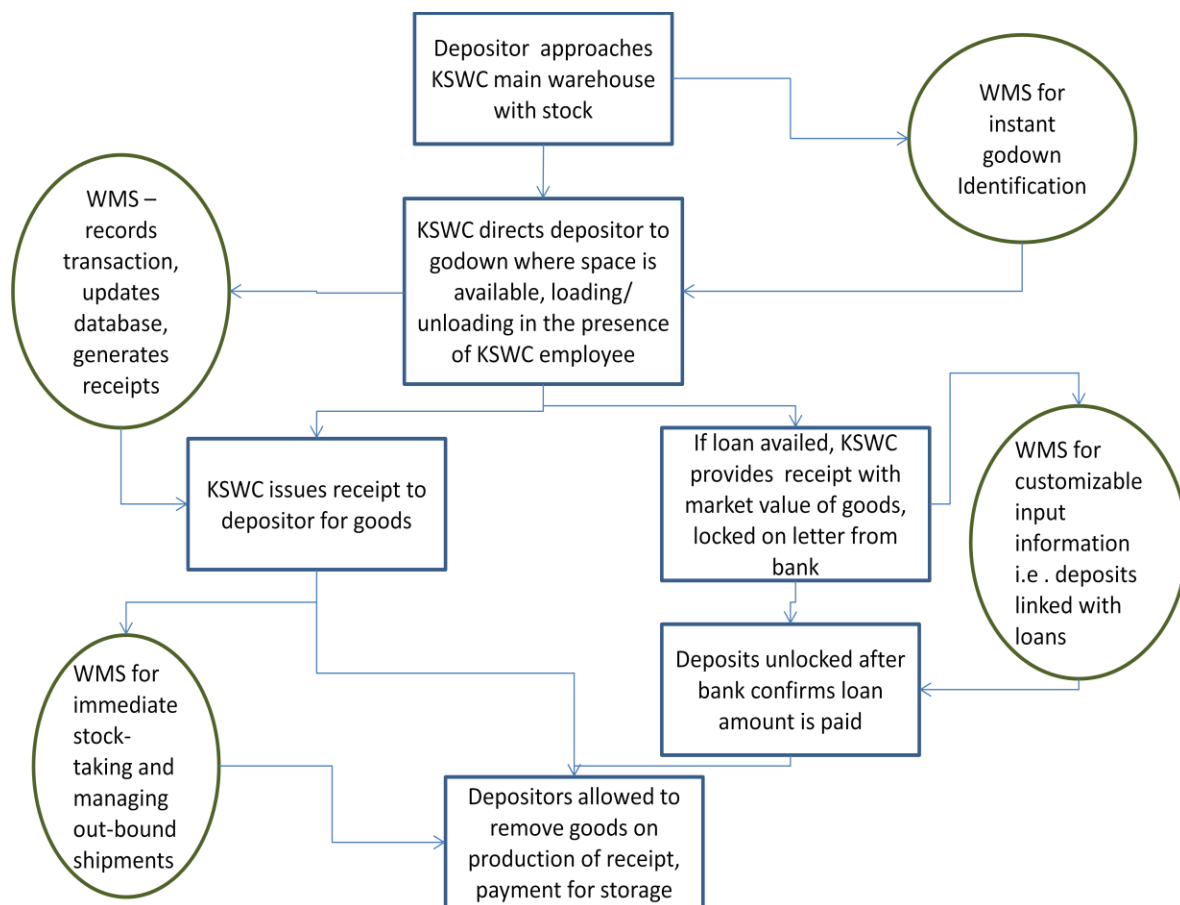
Each of the 128 warehouses owned by KSWC comprises certain number of godowns located in a 10-15 km radius. The number of godowns under a warehouse centre varies greatly, from 3 in Machenahalii (Shimoga) to 38 in Gulbarga -II. The entire structure can be visualized as a hub and spoke arrangement wherein usually a large godown acts as a hub and the smaller godowns around it form the spokes.

The depositor generally approaches the main warehouse and then is directed to the godown where space is available. The loading and unloading of commodities in that warehouse is done by a private contractor in the presence of a KSWC employee.

The receipt for storage is then issued by the KSWC. If the depositor wishes to avail a loan from a bank against the stock deposited, the KSWC issues a receipt mentioning the market value of the commodities deposited. Before sanctioning the loan, the bank sends a note informing the KSWC to lock the specific commodities against which the loan is taken. Only on the receipt of the acknowledgement of the note from the KSWC does the bank disburse any amount. To unlock the commodities, the KSWC would require an authorization letter from the bank, which is issued only after the loan is repaid.

Following flow chart gives a detailed illustration of how WMS can benefit KSWC at each stage of its operation.

Figure 3: Benefits of a WMS in the operation of warehouses



As indicated in the diagram, a warehouse management system would help in integrating processes of KSWC at each stage of a warehouse’s value chain.

KSWC’s major functions can be classified into Inbound, Warehousing and Outbound. Each major function has several components, where WMS system can be used for more efficient operations.

1. Inbound Functions:

- a. Receipts tracking:** KSWC warehouses issue receipts on storage of commodities in godowns. Tracking of receipts is of utmost importance when perishable food grains are stored in warehouses. If a particular consignment is past its expiry period in a warehouse, WMS will enable sending of a mail regarding this will be sent to concerned officials for required action in case the goods are meant for distribution through PDS or the particular depositor would be contacted and asked to move the goods away. Easier and quicker receipt tracking is only possible when a warehouse management system is in place.

- b. Customizable information capture upon receiving goods:** This would include details of loan availed by depositor, which would require the respective deposits to be locked. Once a warehouse management system is in place, removal or movement of the stock against which a loan has been taken would be automatically blocked. This would bring down the possibility of human error to zero.
- c. Rule-driven and space-driven put away methods:** Using a warehouse management system, put-away rules based on configurable parameters like dwell time, volume and material classifications rules can be used to minimize fragmentation, enforce storage policies, reduce obsolescence or implement other storage restrictions. This is especially useful when a particular portion in a warehouse has been reserved for PDS food-grain storage. Also, this would help in effective slotting and optimization when a large number of transactions are required to be processed at a given location.
- d. Cross-docking** – Cross docking mainly refers to Hub and spoke arrangements, where materials are brought in to one central location and then sorted for delivery to a variety of destinations, without being stored there. While this may not be relevant for KSWC immediately, cross-docking would be useful while KSWC decides to make its warehouses function as terminal market centers. WMS can identify cross-docking opportunities in the warehouse by matching expected receipts with outbound shipments using flexible cross-dock rules. This would minimize the product wait time in outbound staging areas before getting cross-docked and ensure greater space availability for goods with a longer dwell time. It is important that the WMS system at present should be scalable to achieve this function in future.

2. Warehouse Function

Stocktaking: Continuous stock-taking, possible only through a warehouse management system, would ensure that stock discrepancies be brought to the notice and corrected much earlier than under the manual system. It would simplify the process of making yearly accounts and also provide real-time occupancy and storage space utilization details.

3. Outbound Function

Managing Billing and Dispatches: A WMS records invoice-raising, their amount and delivery that gets fed into a system and be viewed in one go. Integration with accounting software would provide a picture of real-time warehouse profitability and staff productivity at the central level.

5.2.1 Advantages for KSWC

By streamlining inbound and outbound shipments, implementation of WMS at KSWC warehouses would bring the following specific tangible benefits to the corporation.

1. **Real-time Stock Management:** The location, condition and amount of goods in all the warehouses can be monitored at one place by KSWC. This would give an accurate picture of the demand, supply and buffer stock of food grains at the godowns. This, in turn would enable quick decision making at the central level on matters like hiring extra godowns. Thus all the warehouses with WMS would in a way become a part of a connected material and information network.

In a warehouse management system, all events would have to be logged in order to have detailed historical information and complete visibility of the warehouse activities. Based on this data, dynamic real-time management dashboards tracking Key Performance Indicators (KPI) can be used to ensure proactive control.

2. **Slotting and Optimization:** WMS helps in determining the optimal slot for the stock keeping Unit based on user defined criteria like size, expiry date, seasonality etc. The criteria can be fine tuned given the past data that gets recorded in the WMS system. Optimal slotting helps in minimizing extra moves by equipment and stocking grains of similar quality together. In addition to reducing safety-stock requirements (needed when Govt. decides to increase supply of a particular commodity to bring down its price), a WMS can often increase available warehouse space by more efficiently locating items in relation to receiving and shipping needs.
3. **Electronic Database:** Implementing a real time WMS can considerably reduce paper work as all records can be maintained electronically. Further, past data would be extremely useful in predicting the buffer space requirements for a particular year once information regarding the monsoon is available. This would also help finalize plans on the capacity to be immediately added by hiring extra godowns.
4. **Agro-marketing centres:** Centralizing operations at least at the division level would enable KSWC to create agro-marketing centres at main locations in its divisions; the WMS will facilitate real time monitoring of commodities i.e. the stage of processing—be it grading, sorting, labeling, storage etc. at central and warehouse level. Such real time updates of data will help in co-ordination with the suppliers and buyers at multiple locations in an efficient manner from one location
5. **Automated Report Generation:** WMS system can also be customized to generate reports, if certain processes are not being followed, they can be monitored at the central level.
6. **NCDEX accreditation:** Accreditation of warehouses from NCDEX is possible only a when a WMS system is in place. This could be a potential source of revenue in the future.

Above all, with storage capacity at the warehouses increasing every year and beyond a point the present manual system of entry would simply become unsustainable. It must also be pointed out that WMS would not have adverse impact on the employees but would facilitate their work.

A WMS would simplify manual labour, eliminate redundancy and reduce data entry, storage, and retrieval costs.

Thus, from the impact gauged on its operations, it makes sense for KSWC to introduce WMS and automate its entire operations. To start with, it can execute a pilot project after which it can roll out this system for all its warehouses. It is imperative that while expansion of storage initiatives are on, KSWC starts creating an information backbone to carry out its activities efficiently.

5.3 Site Features

Of the 17 warehouses chosen for the pilot phase of implementing WMS, the consultants visited two warehouses - Gulbarga-II in Gulbarga district and Bagalkote in Dharwad district for a study on their operations and the kind of goods handled. These are the two major warehouses in the Northern Karnataka and it is expected that other warehouses would be similar to these two in operation. A brief note on the two warehouses is explained below.

1. Gulbarga-II warehouse

Gulbarga- II is the largest warehouse in the Gulbarga region. The region includes Gulbarga, Yadgiri, Bidar and Bijapur districts.

Commodities Handled: Fertilizer and Food Grains (Rice, Wheat and Pulses)

Capacity of Warehouse: 75,000 MT (24000 MT owned, 51000 MT hired). Rented warehouses are present within 15 kms of the warehouse. Space for 5000 MT (30000 sq.ft) in the warehouse is reserved for PDS food-grains. Following table gives the major commodities and their quantities

Goods-wise Distribution:

Table 6: Commodities handled by Gulbarga-II

Commodity	Present Stock (Tons)
Fertilizer	25000-30000
Food Grains	45000-50000

Capacity Utilization: 100%

Change in capacity over time: The capacity was increased from 25,000 MTs to 75,000 MTs in 2009-2010. Before the capacity increase, the warehouse was working on little over 100% capacity utilization.

Origin-Destination

Additional details regarding the origin and destination of commodities stored in the warehouse are summarized below. The table also specifies the loading and unloading rates and the storage charges for various commodities.

Table 7: Origin-Destination

Commodity	Origin	Destination
Fertilizer	Manufacturing Units & Imports (Mangalore, Kandla, Trombay, Chennai, Tuticorin, Thal, etc.)	Consumed locally within the district (no exports)
Food Grains (Rice & Wheat)	Haryana and Punjab	Consumed locally within the district (no exports)
Food Grains (Pulses)	From Gulbarga (pulses processing industries)	Consumed locally within the district (no exports)

It is the owner’s responsibility to ensure that all the goods required to be stored in the warehouse reach Gulbarga by rail. These goods are then transported to the warehouse by a private contractor appointed by the warehouse.

However, the warehouse is not responsible for transport from the warehouse to the final destination of the goods. In case of Pulses and Fertilizer, the buyer transports the goods from the warehouse to the final destination and in case of Rice and Wheat (Food Corporation of India’s products for Public Distribution), a contractor appointed by the Government of Karnataka (Krishna Enterprises for Gulbarga-II) transports the goods from the Warehouse to the Wholesale Depot.

The Contractor appointed by the Warehouse is hence responsible for incoming transportation, loading and unloading. The same would be the responsibility of the private player, if the warehouse is to be privatized.

Loading and unloading charges are paid by the customer to the warehouse, which in-turn, is paid directly to the private contractor by the warehouse. Out of the total loading-unloading charge, the private contractor pays 8% to the warehouse as supervision charges.

Dwell Time: Dwell time for the goods stored in the warehouse ranges from 1 day to 3 years. While fertilizer movements are difficult to predict, pulses, on an average are stored in the warehouse for a period of one year.

Interactions with the warehouse manager indicate that computerization through warehouse management systems for optimization of operations remains the top priority for the manager in terms of modernization schemes sought.

2. Bagalkote Warehouse

Bagalkote warehouse, in Dharwad district has a capacity of 20000 Metric Tonnes. The warehouse is the third largest in the region that comprises of 24 warehouses in total. Situated in an area of 10 acres, the warehouse mainly stores fertilizers and food-grains.

Commodities Handled: Fertilizer and Food Grains (Maize, Jowar, Pulses, Rice and Wheat) are the major commodities handled by the warehouse. Rice and Wheat are FCI commodities for the PDS, rest are grown/processed locally.

Table 8: Stock of commodities at Bagalkote

Commodity	Present Stock (Metric Tonnes)
Fertilizer	3000
Food Grains	17000

Capacity Utilization: 100% of the space available is being currently utilized.

Change in capacity over time: The old site in Bagalkote had 3 buildings of 660 tonnes capacity each. Operations shifted from old warehouse to the present one in 2005 when construction of first building of capacity 2,000 tonnes was completed. Following table shows the increase of capacity of the warehouse with time:

Table 9: Year-wise cumulative capacity of Bagalkote warehouse

Year	Capacity of Building Constructed (tonnes)	Number of Buildings constructed	Cumulative Capacity (tonnes)
2004	5,000	1	5,000
2005	2,000	1	7,000
2005	3,000	1	10,000

Year	Capacity of Building Constructed (tonnes)	Number of Buildings constructed	Cumulative Capacity (tonnes)
2011	5,000	2	20,000
2012 (expected)	6,500	1	26,500

Expansion Plans: At present, there is a 6,500 Metric Tonne capacity building being constructed in the same 10 acre complex. The construction is expected to finish within 3 months and an MOU has been signed by the Head Office (KSWC) and FCI for guarantee of storage commodity for 9 years. After this construction, there would be space remaining for a 3,000 MT warehouse building, for which there are presently no plans. KSWC has plans to acquire another 10 acres of land across the road for further expansion once the capacity on the current parcel of land has been exhausted. The land has been notified for the same, but not yet registered.

Origin-Destination of the goods in the warehouse:

Table 10: Origin destination of goods in the warehouse

Commodity	Origin	Destination
Fertilizer	Manufacturing Units & Imports (Mangalore, Kandla, Trombay, Chennai, Tuticorin, Thal, etc.)	Consumed locally within the district (no exports)
Food Grains (Rice & Wheat)	Haryana, Andhra Pradesh and Punjab (and other FCI locations)	NA
Food Grains (Others)	From Nearby Places	NA

The incoming & outgoing transportation as well as loading & unloading are done by the 3rd party itself and the warehouse does not have any role to play in the same. The warehouse does not even collect supervision charges for loading/unloading. Contractors of FCI and Karnataka Food and Civil Supplies Corporation do the incoming transport & unloading and loading & outgoing transport respectively.

Dwell Time: Dwell time for the goods stored in the warehouse ranges from 1 month to more than a year. However, the warehouse does not take any responsibility for goods that are stored for a period greater than 3 months.

From above two site visits following conclusions can be drawn:

1. Foodgrains, pulses and fertilizers are the main commodities handled at KSWC warehouses.
2. KSWC warehousing functions are basic in nature, with depositors being responsible for delivering goods at its doorstep and despatches being handled by customers themselves. Further, majority of delivery is local. Thus, advanced software systems that enable tracking of consignments, barcodes etc are not required for KSWC as of now.
3. Even large warehouses of KSWC are undergoing expansion, which indicates large demand for warehousing space and hence economizing on space becomes more important for KSWC. WMS system optimizes space by dividing warehouses into designated areas and utilizing the space in the most efficient way

5.4 Project Design

The identified private partner would be responsible for providing the required licenses and the associated services for the successful implementation of WMS across the 17 identified warehouses. The services required and the time frame necessary for each service are detailed below.

- **Thorough study of warehouses and KSWC operations:** Even though most WMS vendors would have a core WMS license, it needs to be customized for each client, for which a complete understanding of the operations is required. This phase might take up to 45 days, at the end of which the private player would have the knowledge of customization requirements for KSWC warehouses.
- **Customization:** This phase would translate the results of the first phase into software customizations that would suit KSWC. Depending on the level of customization required, this phase might take 1-2 months.
- **Integration with other software and User Acceptance Testing:** If necessary, the WMS would have to be integrated with other software that the client uses on his existing terminals. This might not be applicable for KSWC. This normally takes about one month.
- **Implementation and roll out:** The final phase involves installation of WMS licenses at each terminal, configuration and removing glitches that might occur in real-time, when simultaneous access from up to 20 users would be required. This could take up to 3 months.

Thus, implementation of a warehouse management system, under PPP, would have the following features.

- **Computer terminals:** The computer terminals present would have the requirements to run WMS on their systems. The operating system that would be needed is Windows XP or higher versions
- **Licensed WMS software:** There are two kinds of licenses, if the WMS network is built on a web-based architecture. One would be a central server license, that would run on the

main server at the KSWC headquarters or a convenient location and the other would be a location license, at each of the 17 warehouses identified for roll-out.

- **Creation of a 3 year electronic database of warehouse deposits and withdrawals:** This would help estimate the total warehousing space needed for the season, once details regarding the monsoon of a particular year are known. For instance, a good monsoon season would result in a rich harvest, increasing the demand for warehousing space. In that case, the capacity can be augmented by hiring additional godowns.

In this context, it is essential to point out that the 17 warehouses need to be connected through internet to the central server. KSWC needs to do one of the following- buy its own server, use NIC servers on which most government websites are hosted or hire a server through the private partner.
- **Maintenance of the system by the private player over the concession period:** Maintenance is provided by all WMS vendors to ensure the smooth functioning of the software. This would take care of fixing bugs in the software, additional customization that may be required and keeping the WMS upgraded and compatible with the latest operating systems in the market.
- **Skilled professionals to operate WMS during this concession period:** It is assumed that one operator would be required for smaller warehouses i.e. for those warehouses which comprise of 3- 20 godowns and two operators would be required for larger warehouses that contain more than 20 godowns. These skilled operators would be responsible for operating WMS throughout the concession period.
- **Training of the KSWC employees at the warehouses to operate the WMS:** It is proposed that the private partner would conduct a workshop every two months throughout the license period for the benefit of KSWC employees, who would operate the WMS after the license period. The private partner would be responsible for arranging WMS software professionals to conduct these workshops.
- **Flexibility for other customizations:** NCDEX accreditation is not sought by KSWC currently. However, if KSWC decides to go for NCDEX accreditation at some point in the future, the software would need to be customized so that it is compatible with the trading platform. Customization would also be required if the WMS would need to include features like cross docking to allow warehouses become agro-marketing centres. The software offered will be customizable for the same.

6 Project Financials

Financial analysis is done for the six year period, starting 2011-12. It is assumed that the concession period with the private partner would be for five years, starting 2013-2014.

6.1 Cost Assumptions

6.1.1 Capital expenditure assumptions

Following are some of the capital cost assumptions for the project.

The total capital cost has two components – hardware and software costs.

1. The hardware required is taken to be only computer terminals. The cost of a computer terminal is taken as INR 40000. A minimum of 1 computer is required for each warehouse. Further, if a warehouse (location) has more than 20 godowns, an extra computer terminal would be required.
2. After consultations with various WMS vendors, the license cost for each location has been taken as INR 10 Lac. The cost of the central server license has been taken as INR 25 Lac. The software license is an Intellectual Property owned by the WMS vendors. The license cost charged to the client includes a 60% mark-up on the following costs.
 - Research and development costs for developing the software.
 - Cost of carrying out detailed studies to find out customization required.
 - Customization costs of the WMS software.
3. It is also further assumed that the capital expenditure will be equally split in the initial two years i.e. 2012-13 and 2013-14.

The total capital expenditure for each cluster is given below.

Table 11 : Cluster-wise capital expenditure

Cluster	Number of warehouses	Capital cost (INR Lac)
Cluster I	6	77.20
Cluster II	6	63.56
Cluster III	5	56.91
All clusters	17	165.97

It can be seen that the cost of implementing WMS across all three clusters would be lesser than the sum of individual cluster costs since only a single server license would be required irrespective of the number of warehouses.

6.1.2 Financing assumptions

The following table gives the financing assumptions that have been used for the project.

Table 12 : Financing assumptions – Private Partner

Financing Assumptions	
Equity	100.00%
Debt	0.00%
Cost of Debt	12.00%
Cost of Equity	20.00%
WACC	20.00%

6.1.3 Depreciation assumptions

Depreciation assumptions for the project are as follows.

Table 13: Depreciation Assumptions

Depreciation	Rate
WDV for Income Tax Assumptions	
Computers and other Hardware	40% p.a.
SLM for P&L	
Computers and other hardware	16.67% p.a.

6.2 Revenue assumptions

Revenue to the private player is assumed to be in the form of annuity payments from the government for the various components including software license, maintenance, salary of the WMS operators and software engineers, boarding and lodging expenses for the operators and re-sale value of the hardware at the concession period. Basic assumptions and annuity payments are detailed below.

Table 14: Basic assumptions for the project

Employees required	Number
WMS Operators	Minimum of 1 operator per warehouse. An extra operator if a warehouse has more than 20 godowns.
Software engineers	One software engineer per cluster
Data entry operators for migration of 3 year transaction data into WMS	1.25 operator months assumed for each warehouse. Salary: INR 12000 per month

Annuity payments for the first year of the license period (2013-2014) are shown below. These annuity payments have been assumed in such a manner that the private player gets sufficient returns over the license period.

Table 15: Assumed annuity payments for the year 2013-2014

Cluster	Cluster I	Cluster II	Cluster III	All clusters
Annuity payment (INR Lac)	58.22	48.65	43.26	131.03

Income from the sale of computers and other hardware devices to KSWC is a one –time payment in the year 2017-18.

The project is structured in such a way that the annuity actually paid by the government to the private partner would be increasing at 8 % each year. This rate has been arrived after taking into account the escalation cost of each component of the operating expense of the private player, the details of which are given in the following section.

6.3 Operating expense assumptions

Each annuity component is determined by marking-up the operating expense for that component by a certain rate as shown in the previous table. To determine the actual operating expense for each component, some assumptions have been made based on primaries with WMS vendors. These are detailed below.

Table 16: Operating expense assumptions

Assumptions	Amount
Annual Salary assumptions	
Annual salary per operator (In INR Lac)	1.44
Annual salary per software engineer (In INR Lac)	4.50
% annual increase in salary of employees	5%
Training expenses assumptions	
Number of workshops per year	6
Number of WMS experts for each workshop	5
Hiring cost per expert per workshop (In INR Lac)	0.08
Annual % increase in training costs	5%
Boarding and lodging expenses assumptions	
Annual boarding and lodging expenses per operator	0.96
% increase in boarding expenses each year	5%

6.4 Viability Assessment (NPV, Project IRR, Equity IRR)

The NPV, Project IRR and equity IRR have been calculated for the case when an annuity payment of INR 131 Lac was considered for all the clusters together. The dependence of each of these parameters has been studied when operating expenses and annuity payments are varied.

Table 17: Sensitivity to changes in operating expenses

% Change in Operating expense	NPV for the private partner (INR Lac)	Project IRR	Equity IRR
0%	7.40	22.94%	22.94%
25%	(27.36)	8.81%	8.81%
20%	(20.41)	11.71%	11.71%
15%	(13.45)	14.57%	14.57%
10%	(6.50)	17.39%	17.39%
5%	0.45	20.18%	20.18%
0%	7.40	22.94%	22.94%
-5%	14.35	25.67%	25.67%
-10%	21.30	28.38%	28.38%
-15%	28.25	31.07%	31.07%
-20%	35.20	33.75%	33.75%
-25%	42.15	36.41%	36.41%

Table 18: Sensitivity to changes in annuities

% Change in income earned	NPV for the private partner (INR Lac)	Project IRR	Equity IRR
0%	7.40	22.94%	22.94%
25%	267.98	86.87%	86.87%
20%	202.90	74.92%	74.92%
15%	144.93	62.72%	62.72%
10%	93.43	50.14%	50.14%
5%	47.78	37.00%	37.00%
0%	7.40	22.94%	22.94%
-5%	(28.25)	7.21%	7.21%
-10%	(59.65)	-12.41%	-12.41%
-15%	(87.26)	-	-
-20%	(111.49)	-	-
-25%	(132.73)	-	-

The NPV of annuity payments over the license period that the government has to pay the private partner to ensure an IRR of ~23 % are given below.

Table 19: NPV of annuity payments

Cluster	NPV of annuity payments (INR Lac)
Cluster I	214.59
Cluster II	179.31
Cluster III	159.39
All clusters with different project partners	553.49
All clusters with the same project partner	482.92

It can be seen that the government would save INR 70 Lac in terms of payments it makes to the private partner when all the three clusters of warehouses are taken up a single partner for implementation of WMS. This saving can be attributed to the fact that each private partner would need to be compensated for a server license when three partners exists. Therefore, it is recommended that one qualified WMS vendor takes up the entire project.

6.5 Value for Money

Value for Money (VFM) analysis is essentially a cost-benefit analysis, where it is examined if the benefits of the project are positive as compared to alternative procurement method. A PPP project is said to achieve value for money if it costs less than the best realistic public sector project alternative which would deliver the same services.

However, in case of this project, the public sector will not be able to execute the project on its own due to lack of required expertise. Thus, the project being implemented on PPP basis holds Value for Money for the government for creating infrastructure that will bring about efficiency gains in the warehousing operations of KSWC, which otherwise could not have been implemented if executed by public sector alone.

7 Statutory & Legal Framework

7.1. Legal & Regulatory Framework

The Karnataka State Warehousing Corporation was established during November 1957 under the Agricultural Produce (Development and Warehousing) Corporations Act 1956 later repealed by the Warehousing Corporations Act 1962. The Government of Karnataka and the Central Warehousing Corporation are the two share holders of the Corporation having 50:50 basis equity shares.

The board of directors of KSWC, apart from the Chairman and the Managing Director, consist of

- Five directors nominated by the Central Warehousing Corporation of whom one shall be nominated in consultation with the State Bank and one at least shall be a non-official.
- Five directors, nominated by the state government.
- A Managing Director, appointment by the state government.

With regard to the policies to be followed by the KSWC, the act stipulates that the Board of directors shall act on business principles having regard to public interest and shall be guided by such instruction on questions of policy as may be given to them by the State Government or the Central Warehousing Corporation.

The state is divided into seven regions- Mysore, Davanagere, Hubli, Bangalore, Gulbarga, Raichur and Shimoga, each headed by a Regional Manager.

The act also authorizes the warehouses under KSWC to store the following commodities:

- Fibres –Cotton, San hemp, Agave, coir and their products.
- Cereals.
- Pulses.
- Oilseeds including copra and their products.
- Cashewnuts, coconuts.
- Jaggery, Sugar and Khandasari.
- Fruits.
- Vegetables, potatoes, onions.
- Animal Husbandry Products - Wool, Butter, Ghee, Milk, Eggs.
- Fish.
- Condiments, spices and others - Coriander, Chillies Turmeric ,Garlic, Ginger, Cummin, Tamarind, Cardamom, Pepper, Soap-nut, Areca, Coffee.

- Cattle fodder.
- Tobacco.
- Fertilizers.

The duties of the officials of the KSWC, as mentioned under the Warehousing Corporations Act, state that the General Manager would be responsible for matters relating to Expansion and Diversification of Activities of the Corporation and fixing storage charges, studying the costing and suggesting improvement in the economics of warehousing.

It must be clearly pointed out that the Warehousing Corporations Act of 1962, while mentioning the terms and conditions for issue, renewal and suspensions of licenses, does not prohibit any initiatives by the KSWC to be taken up under Public Private Partnerships (PPP). However, gaining NCDEX accreditation for the state warehouses, if required later would come under business policies and would therefore require a clear policy directive from the state government.

8 Indicative Environmental And Social Impacts

8.1 Environmental Impact

The implementation of WMS in KSWC warehouses has no visible environmental impact, as it is mainly a software implementation and rollout project.

8.2 Social Impact

Implementation of Warehouse Management Systems in the state warehouses would streamline the movement of food-grains from the producers (farmers) to the consumers (market) either directly or through the Government (PDS scheme).

This would help the government to forecast storage space requirements in the state, during extreme conditions of bumper harvest and drought.

Therefore, the entire project would bring about efficiencies in storing agricultural commodities. This will be highly beneficial in the long run as it will allow the warehouses to become terminal agro-market centres by facilitating real time monitoring of commodities at central and warehouse level. This would help in bringing about co-ordination among the suppliers and buyers immensely benefitting farmers and consumers across the state.

9 Operating Framework

9.1 Risks & Mitigation

The potential risks and the mitigation measures for the proposed PPP project are detailed below.

Table 20: Associated Risks and Mitigation Measures

Risks	Mitigation measures
Delay in implementation and roll-out of WMS across the 17 identified warehouses	Strong Service Level Agreements specifying timeframe for each phase need to be signed with the private partner.
Piracy of installed software	Only qualified WMS vendors having well-defined valid IPs for their licenses need to be allowed for bidding. Such measures should be a part of contractual obligation of the vendor.
Delay in annuity payments from the Government	An escrow account where an independent trusted third party receives and disburses money and/or documents for the transacting parties needs to be in place. The timing of such disbursements by the third party would be dependent on the fulfillment of contractually-agreed conditions by the private partner and KSWC.
Resistance by KSWC employees for the project, leading to a non-conducive working environment for operators provided by private partner	Measures to sensitize KSWC employees are required. KSWC would need to convince its employees on the benefits of WMS, making it clear that it would supplement rather than substitute human capital requirements.

9.2 Indicative Project Structure

Table 21: Indicative project structure

Component	Description
Structure	<ul style="list-style-type: none"> • PPP project, annuity model. • Private partner owns hardware during license period, sells it to KSWC at the end of five years. • WMS vendor quoting the lowest annuity bid gets the project. • WMS vendor maintains and operates the software at the 17 warehouses during the entire license period
License Period	<ul style="list-style-type: none"> • 5 years
Payment from Concession Authority	<ul style="list-style-type: none"> • Predetermined annuity payments. • Total base year annuity amount to be quoted by bidder • Annuity increases by 8% every year. • Annuity components include software license and maintenance cost, operators' salaries and boarding and lodging expenses, salary of software engineers, migration of 3 year transaction data to WMS, training KSWC employees on WMS.
Role of Concession Authority	<ul style="list-style-type: none"> • KSWC provides a central server to host the WMS license. • KSWC ensures that internet connectivity is provided to the 17 warehouses identified for WMS roll-out. • Data to be migrated to WMS is provided as per the pre-format suggested by the vendor.
Role of Private Partner	<ul style="list-style-type: none"> • Understand the customization required for KSWC in core WMS; responsible for implementation and roll-out across 17 warehouses within a period mentioned in the tender. • Provide operators and software engineers to maintain and operate the WMS at the 17 warehouses for the license period. • Provide data entry operators to migrate data in the suggested pre-format to WMS software. • Arrange workshops once every 2 months for KSWC employees for training them on WMS.

10 Way Ahead

10.1 Next Steps

The immediate milestone for the Project would be

- Preparation of Tender Documents for Selection of Transaction Advisor for the Project

Tender documents will be prepared for selection of Transaction Advisors which would include the following:

- Detailed Scope of Work including deliverables and timelines for submission.
- Outlining the minimum eligibility criteria, which the bidders would necessarily have to meet before their bids are evaluated in detail.
- Description of Evaluation process elaborating the various evaluation parameters and their respective weightages.

Further, it is essential that the Transaction Advisor is competent in the field of Information Technology. The scope of work, the eligibility criteria and most importantly the evaluation process of the implementation would all be different from usual PPP projects; therefore prior experience for the Transaction Advisor as an IT consultant would help structure this project and the Service Level Agreements in a better way.

The transaction advisor would come up with a draft Agreement which would spell out the following:

- The Obligations and Scope of Work for the private partner.
- Progress Reporting Mechanism.
- Dispute Resolution Mechanisms.
- Termination of Contracts by either of the parties.
- Defining conditions and events leading up to a default in obligations.
- Conditions construing Force Majeure
- Conditions leading up to a termination of Contract and invoking of the Performance Guarantee.
- Strong specific Service Level Agreements mentioning timeframes for all services that are a part of the contract with the private partner.

Capacity Building of PPP Cell Personnel

Capacity Building Workshops will be conducted for officials who are identified as PPP Cell personnel by the department. These workshops will be conducted in order to enable these

personnel in understanding the concept of PPP, model procedures and documents related to implementation of PPP projects, key issues related to PPP etc. Three training sessions will be organised as a part of capacity building. Various techniques of effective communication like audio-visual media in form of PowerPoint presentations, videos, notes, interaction dialogues etc will be used for these capacity building sessions.

10.2 Recommendations

Keeping in mind the nature of the project, the following recommendations are made.

- KSWC should go for WMS implementation in the 17 warehouses identified, as it will bring with it a host of benefits including efficiency in operations that will improve service delivery to end users
- A single private player for implementation and roll-out of the project in all 17 warehouses is preferable. As per the analysis done by the Consultant, the overall cost of the WMS to the Government will be ~13 % lesser in this scenario than in the situation where each cluster is given to a separate player
 - Operationally too, it is easier to work with one central server license rather than integrating 3 server licenses together.
- It is necessary that the transaction advisor chosen for this project has sufficient expertise in the field of IT. This will ensure that deliverables and other requirements are clearly defined and leave no scope for ambiguity.

11 Annexure

11.1 Cash-flow Statement for the Project

An indicative cash-flow statement for the license period of the WMS project is given below. It has been prepared under the assumption that the implementation of the project is for all the 17 warehouses together with the annuity payment for the year 2013-2014 being INR 141.51 Lac.

Table 22: Cash-flow statement

Cash flows (In INR Lakhs)	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Cash Inflows						
Equity	80.96	85.01	0.00	0.00	0.00	0.00
Debt	0.00	0.00	0.00	0.00	0.00	0.00
Income	0.00	141.51	152.83	165.06	178.26	192.53
Total cash inflow	80.96	226.52	152.83	165.06	178.26	192.53
Cash Outflows						
Capital expenditure	80.96	85.01	0.00	0.00	0.00	0.00
Interest expenses	0.00	0.00	0.00	0.00	0.00	0.00
Principal repayment	0.00	0.00	0.00	0.00	0.00	0.00
Operating expenditure	0.00	75.37	79.52	83.93	88.60	93.55
Taxes	0.00	21.22	23.30	25.83	28.60	31.63
Total cash outflows	80.96	181.60	102.82	109.76	117.20	125.17
Post-tax Cash flows	0.00	44.92	50.01	55.30	61.06	67.35
Project IRR (In INR Lakhs)	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Capex	80.96	85.01	0.00	0.00	0.00	0.00
PBT	0.00	65.41	71.80	79.63	88.16	97.47
Depreciation	0.00	0.73	1.50	1.50	1.50	1.50
Interest	0.00	0.00	0.00	0.00	0.00	0.00
Tax	0.00	21.22	23.30	25.83	28.60	31.63
Pre Tax Cashflow	(80.96)	(18.86)	73.31	81.13	89.67	98.98
Post Tax Cashflow	(80.96)	(40.09)	50.01	55.30	61.06	67.35
Project IRR	22.94%					
Project NPV (In INR Lakhs)	7.40					

Equity Cash Flows	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Equity	80.96	85.01	0.00	0.00	0.00	0.00
PAT	0.00	44.19	48.51	53.79	59.56	65.85
Book Depreciation	0.00	0.73	1.50	1.50	1.50	1.50
Principal Repayment	0.00	0.00	0.00	0.00	0.00	0.00
Equity Cash Flow	(80.96)	(40.09)	50.01	55.30	61.06	67.35
Equity IRR	22.94%					
Equity NPV (In INR Lakhs)	7.40					