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Use of supply chain assessment in RWSS projects as an effective project management tool

K. Dahanayake, Sri Lanka

In simple terms, supply chain means transfer of materials and services from the manufacture / service provider through intermediate actors or directly to the end user. In RWSS, there is a potential for goods and services to be supplied through a supply chain from manufacturers, importers and service providers through a network of distributors directly to dispersed customers. Lack of proper supply chains lead severe drawbacks in RWSS project implementation. There is very little experience in analyzing rural supply chains in Sri Lanka, if not elsewhere in the world. This report contains a model for assessing the local supply chain based on the Sri Lanka context. The objective of the assessment is to determine limiting factors for community procurement and private sector provision of goods and services for construction of RWS schemes and to develop a strategy to overcome observed constraints and weaknesses in local supply chains during project preparation..

Introduction

In simple terms, supply chain means transfer of materials and services from the manufacture / service provider through intermediate actors or directly to the end user. In Rural Water Supply and Sanitation (RWSS) Projects where target villages are spread in a large area, supply chain patterns may vary from village to village, due to geographical location, accessibility, socio economic situation and local marketing/manufacturing patterns. Therefore, supply chain performance has a substantial impact on the project progress. Lack of proper supply chains lead to procurement delays, substandard materials, poor services, high per capita capital investment levels and difficulties for operation and maintenance (O&M). Alternatively, efficient supply chain means timely project completion with adequate quality standards within an acceptable capital cost limit, which is prerequisite for the long term sustainability of RWSS projects.

It has been observed that supply chain assessment has been given a low prominence under most of the ongoing RWSS projects. In most instances, sudden surges in demand for

construction material and services are beyond the capacity of existing supply chains. Because of that, systematic supply chain performance assessment during project planning stage will be useful to prepare more realistic implementation programs, project budgeting and disbursement plans and to identify prevailing supply chain constraints for early remedial actions. Therefore, supply chain assessment need to be used as an effective project management tool in RWSS project implementation. This paper attempts to develop a model for supply chain assessment which can be used for future RWSS project implementation. The model was developed based on prevailing RWSS sector situation in the Sri Lanka context, but can be adjusted to suit given local conditions.

Supply Chains Applicable to RWSS

Scope of supply chain may vary from project to project depending on intended project objectives, implementation approach adopted and technologies identified for application in project target areas. Indicative list of items/services involved in typical supply chain, relevant actors in the supply

Table 1. Indicative list of items/services involved in typical supply chains

No.	Item/Service	Associated Actors	Key Constraint Identified
1	PVC pipes, fittings	Manufacturers, Agents, Retailers	Demand generally exceeds supply capacities where piped water supply schemes proposed
2	Cement	Manufacturers, Importers, Agents, Retailers	Generally available in rural areas, but as there are number of brands in the market, difficult to select acceptable quality brands
3	Fine & Coarse aggregates	Building Material suppliers	Availability varies depending on the locality and weather conditions
4	Ground water investigation and drilling	Government Agencies, Private service providers	Not available locally. To be obtained from provincial capital or from the country capital
5	Pump supply & installation	Private service providers	Not available locally. To be obtained from provincial capital or from the country capital

chain and the key identified constrain on supply chain performance based on past experience in the Sri Lanka RWSS sector context are listed in the Table 1. Even though item and services indicated in the Table 1 limits to construction activities, the supply chain assessment needs to be extended to O&M activities to ensure long term sustainability of facilities provided.

For a comprehensive assessment, it is necessary to identify the list of every important material and services to be procured. Generally building materials are available at hardware shops located at nearby towns. Transport of material to required location is depend on the availability of motorable roads and the availability of transport facilities.

Project Implementation Approach

Supply chain performance is sensitive to the implementation approach adopts by the project. Important questions to be clarified during the assessment are:

1. Who is going to procure material and services? What is the role of the community?
2. What is the procurement /payment procedure?
3. When is going to procure? What is the pattern of demand fluctuations
4. What is the project scope? How many village sub projects implement in parallel?

Project concepts and objectives also have an impact on supply chain. Some of the notable impacts are:

- a) Private sector participation policy :- If the project promotes private sector participation, more attention might need to focus on private sector material / service providers
- b) Role of NGOs: - If NGOs are used as partner organizations for sub project implementation, availability of suitable NGOs has to be considered as a part of the supply chain
- c) Devolution of responsibilities for procurement:- Role of community in decision making and procurement has an impact on the supply chains performance. Generally suppliers are sensitive to the reliability of the customer. If community going to take the lead role in procurement activities, an adequate safety net for suppliers to ensure their payment may require
- d) Provision for collective purchasing:- If there is a provision to purchase material in bulk for group of village sub projects, supply chains may react different to retail buying

Therefore, any sensitive supply chain assessment can not be limited to a mathematical model but needs to be carried out with a fair amount of qualitative approach. This implies that the assessment team should have substantial experience on the RWSS sector, in order to obtain a realistic out come from the assessment.

Assessment Model

Figure 1 given below shows different variables which affect the performance of the supply chain. The three main critical factors are; (1) Availability, (2) Price and (3) Quality. There may be various constraint effecting supply chain performance. Some of the constraint are decisive constrains which technically break the chain. For the assessment, numerical value has to be assigned to all of these variables, depending on the intensity of the impact.

Suggested points assigned to each variable are given in Table 2:

Table 2. Marking system for each variable			
Points for variables			
	Main variable	Sub variable	Point assigned
1	Availability (A)	Quantity (q)	35
		Distance (d)	5
		Access Roads (a)	5
		Transport Facilities (t)	5
2	Price (P)	Unit Price (u)	20
		Discount for bulk purchase (b)	5
		Price fluctuation sensitivity (f)	5
3	Quality (Q)	Material/Service quality level (q)	15
		After sale service, easiness for maintenance (s)	5
Sub Total			100

It is important to design the assessment model to reflect the interdependency among variables. If one main variable fails, the supply chain may break or may weaken substantially.

Total points for availability (A) will be calculated as

$$A = (q+d+a+t) \times k_1$$

where $k_1=1$ if $g,d,a,t,>0$ and $k_1=0$ if $g,d,a,t=0$

Similarly total points for price (P) will be calculated as

$$P = (u+b+f) \times k_2$$

where $k_2=1$ if $u,b,f,>0$ and $k_2=0$ if $u,b,f=0$
and

total points for quality (Q) will be calculated as

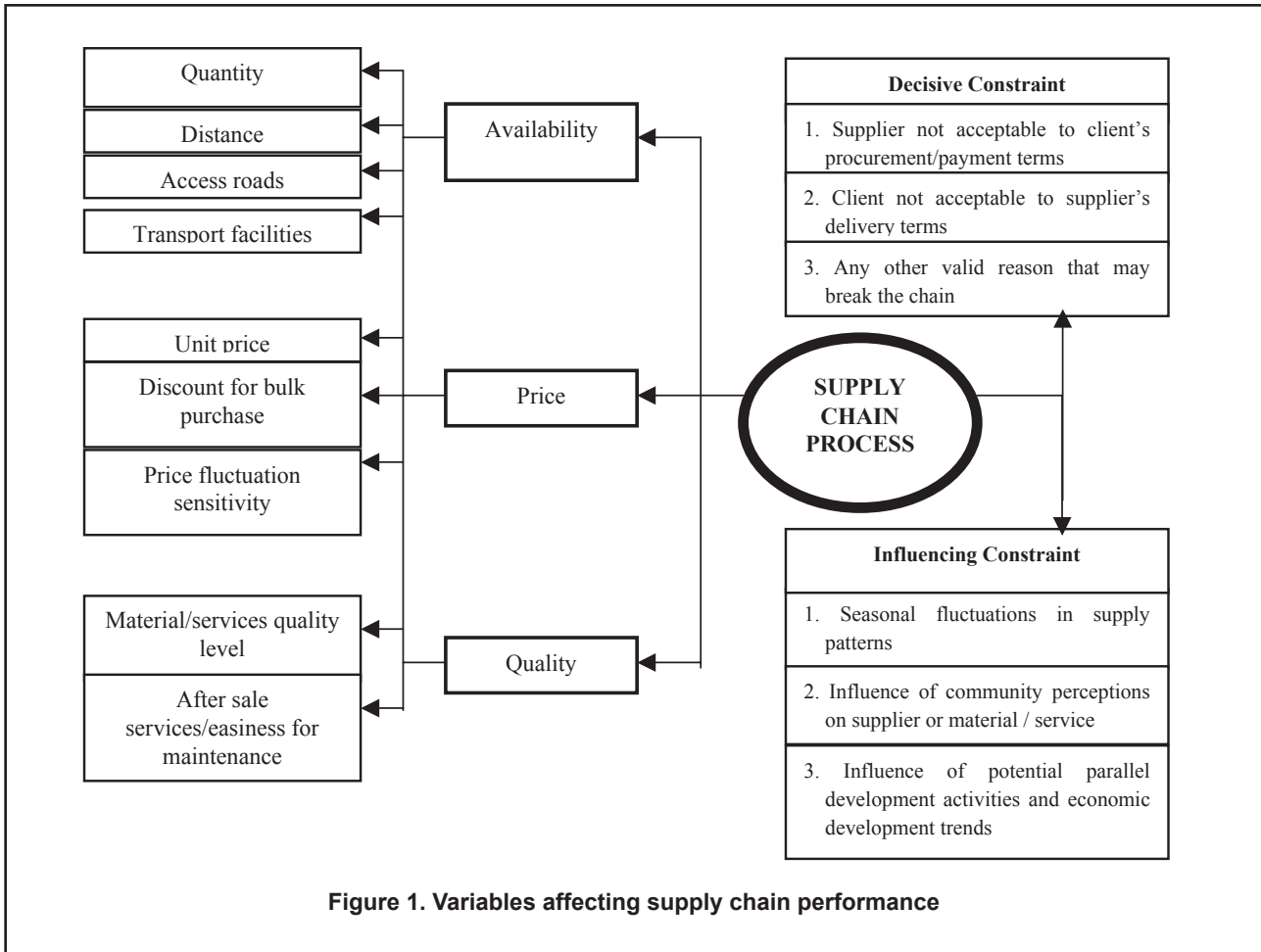
$$Q = (q+s) \times k_3$$

where $k_3=1$ if $q,s,>0$ and $k_3=0$ if $q,s=0$

Therefore the total base points (B) will be:

$$B = (A+P+Q) \times k_4$$

where $k_4=1$ if $A,P,Q,>0$ and $k_4=0$ if $A,P,Q=0$



Total point assigned (T) for any material or service will be:

$$T = (B - I) \times 1 / k_s$$

where I = Total influential constraint point

- $k_s = 1$ if no decisive constraint,
- $k_s = 2$ if one decisive constraints,
- $k_s = 3$ if two decisive constraints,
- $k_s = 4$ if three decisive constraints,
- I = 0 if no influential constraint
- I = 5 if one influential constraint
- I = 10 if two influential constraints

I = 15 if three influential constraints

Strength of the supply chain can be classified as given in the Table 3.

Assessment Approach

Supply chain assessment needs to be carried out during feasibility study stage of the project. This will help to evaluate the performance of supply chains for the overall project planning process. As a comprehensive assessment is expensive and time consuming, conducting a rapid assessment in a appropriately selected sample is recommended. Flow chart for the assessment is given in the Figure 2 on page 4.

Table 3. Classification of the supply chain strength		
	Points Range	Classification of the supply chain
1	80 -100	very strong
2	60-80	strong
3	40-60	moderate
4	20-40	poor
5	<20	very poor

Conclusion

The outcome of the assessment can be used to:

- Determine limiting factors for community procurement and private sector provision of goods and services for construction of RWS schemes.
- Develop a short-term strategy to overcome observed constraints and weaknesses in local supply chains.
- The assessment will produce the following outputs as well:
 - Definition of criteria for availability and quality.

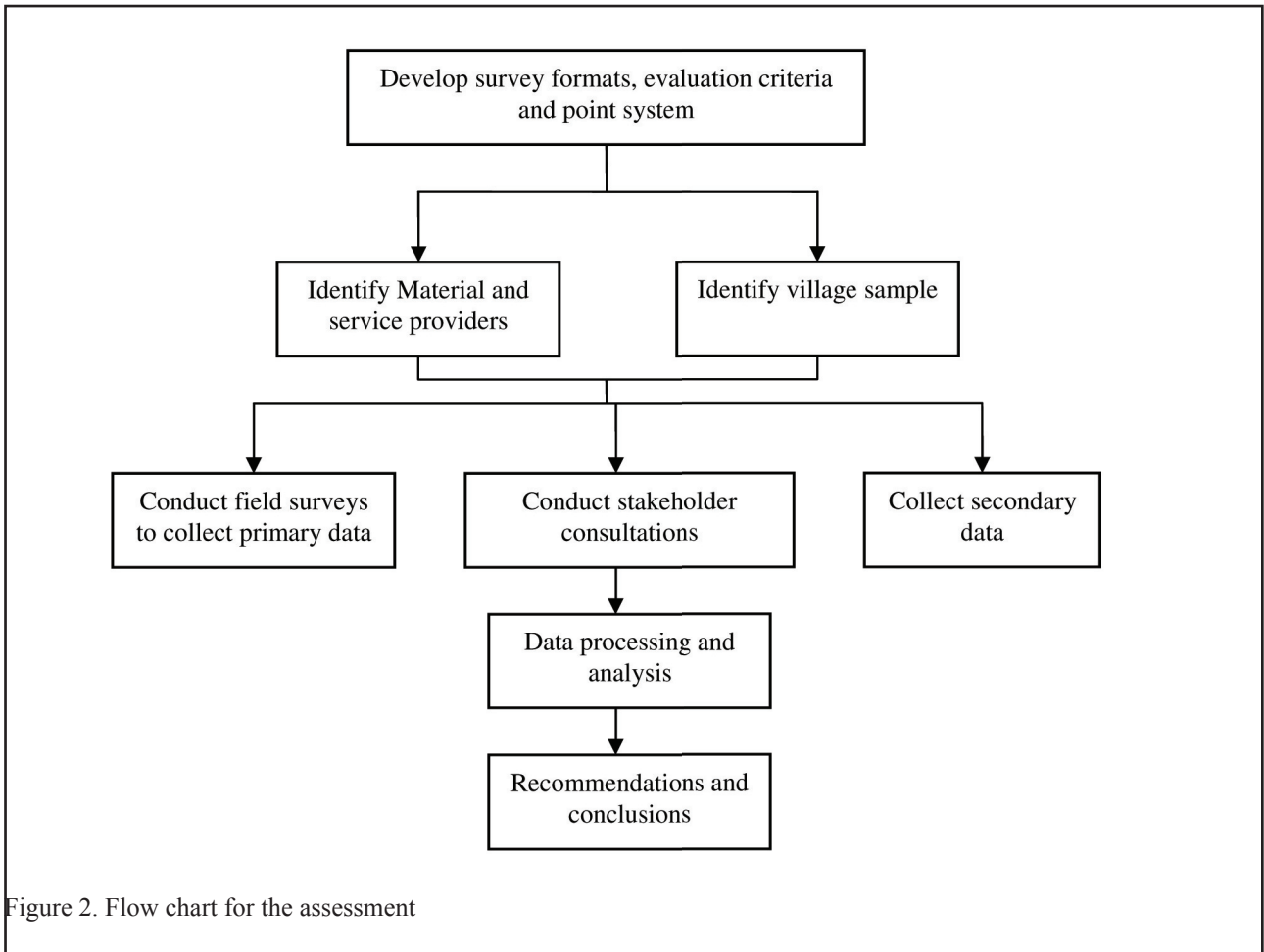


Figure 2. Flow chart for the assessment

- Rapid market assessment of local availability and quality of supplies and services for construction of RWS schemes.
- Assessment of constraints faced by communities and suppliers and providers in provision of quality products to dispersed rural markets.
- A short-term strategy to improve local supply chains to ensure reliable supply of quality materials and services to rural communities.
- Supply chain assessment is particularly important for large rural water supply projects where high surge in material and service can be expected. Based on the outcome of the assessment, actions to be taken to maintain effective supply chain system. These recommendations can be used to prepare project implementation schedules, procurement plans, project costing and O&M arrangements. The recommendation will also useful to decide appropriate technical options, staff requirements and local level skill development requirements.

Contact details

Kamal Dahanayake
 Technical Consultant
 Coffey MPW Pty Ltd
 9th Floor, Sethsiripaya
 Battaramulla
 Sri Lanka

Tel: 5517183
 Email: waterdiv@stmail.lk
