

Germany Vietnamese Project: Management of mineral resource exploitation in
Hoa Binh Province – a contribute for sustainable development in Vietnam
(MAREX)

Potential assessment of calculating material flows of
construction materials from mining areas
- Case studies for 3 types of mines in Luong Son, Hoa Binh -

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2. The potential approach of MFA in building material mining industry in Luong Son, Hoa Binh
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Abstract

The report presents an initial potential approach on the calculation of material flows in mineral extraction for 3 types of mines (basalt, limestone, clays) in Luong Son district, Hoa Binh province. For the matter of material balance and the material flow analysis (MFA) respectively, such data are crucial which state the production potential, product yield, product quality (supply side), demand for using the type(s) of product, market, transfer locations (retailers, dealers), locations of direct consumption, consumption quantities (demand side). Moreover, the waste should be taken into account, especially quantities of wasted rocks and soil, waste dumps, the (specific) rate of waste per unit of product. Therefore, the collection and processing of input data for the calculation model is of decisive significance. Based on the current availability of the data of the case studies in Hoa Binh, the report presents three approaches to apply MFA, from simple to complex as well as pointing out the relevant issues for material flow analysis with regard to the mining sector of construction materials.

The results of this report represents a sub-branch within the MAREX project. MFA will be done in order to assess current and future demand for construction materials in Hoa Binh province and in Hanoi through the consideration of all relevant steps of resource consumption such as mining, processing, usage within the construction environment and recycling/disposal; .

These research results shall provide a scientific basis and a starting point to support discussion on issues related to material flows, aiming at further propose appropriate solutions toward the objectives of sustainable development in Hoa Binh province.

1. Benefits of MFA to mineral mining industry as building materials.

- Determination of material flows (inputs, outputs, waste, waste reuse)
- Identify sources of waste generation, the ability to material losses
- Cause environmental pollution
- Identifying the needs of exploitation and the ability of provision
- Pointed out the weaknesses in management
- Create knowledge basis to propose appropriate solutions for improvement of the environment, production efficiency and rational use of resources
- Support for Better planning (a company which produces, region,)
- Reduce costs for companies.
- Contributing to sustainable development

2. Khả năng tiếp cận MFA trong ngành khai thác khoáng sản

2.1. Demand for data

- ✓ Types of data
- ✓ Purpose of data use
- ✓ Approach of data
- ✓ Check the reliability of data.

Material balance in mineral mining

- Production potential
- Product yield
- Quality products for supply
- Demand for use of the product

- Consumer market
- Transfer locations (dealers/retails)
- Location for directly using products
- Quantity of products for use

- Quantity of Disposal of soils, waste dumps
- The proportion of waste rock per unit of product

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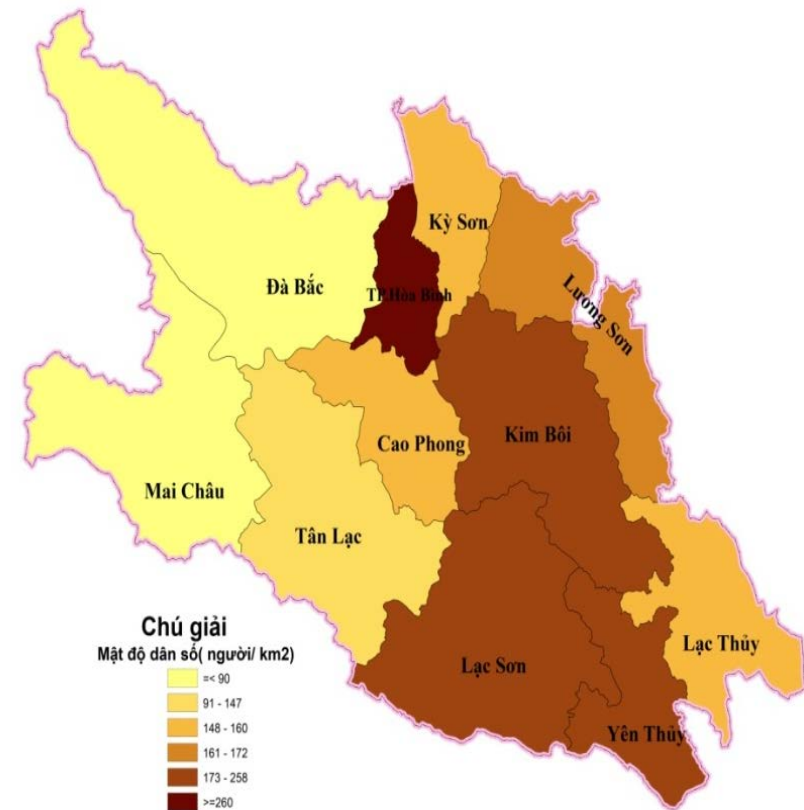


- Quantity of Disposal of soils, waste dumps
- The proportion of waste rock per unit of product



2.2. ABILITY TO PROVIDE DATA FOR MFA PROBLEM IN MINING IN LUONG SON, HOA BINH

- Number of mines silenced to operate: 38
- Number of operating mines: 20
- Type of exploitation:
 - Limestone
 - Basalt
 - Clay
- Survey
 - In general: 35 mining sites
 - In detail: 6 mining sites (physic sampling)
 - Hop Tien, Quang Long, Trung Son (3 casestudies of MAREX)
 - Song Da 11, Army, Khai Hung



➤ Type of information to be collected

- Coordinates
- Type of product
- Reserves
- Capacity
- Type of waste / volume / waste characteristics
- Waste management
- Implementation of commitments under the EIA

2.2. Ability to provide data from companies as case studies (Hop tien, Quang Long, Trung Son)

Table 1. Type of products and sản lượng khai thác - Hợp Tiến-

Công ty	Số khai trường (vị trí) đang khai thác	Loại tài nguyên	Trữ lượng cho mỗi loại tài nguyên (2015)	Loại sản phẩm		Sản lượng khai thác (2013) m ³	Sản lượng khai thác (2014) m ³	Sản lượng khai thác (2015) m ³	lượng khai thác theo kế hoạch (m ³)
				Sản phẩm	Kích cỡ (cm)				
Hợp Tiến	1	Basalt		Basalt	10-50	55.000	60.000	58.000	115.000
				Basalt	4-6				
				Basalt	2x4	15.000	16.000	14.000	
				Basalt	1x2	20.000	21.000	23.000	
				Basalt	0,75	5.000	4.000	10.000	
				Basalt	0-0,5				

Bảng 2. Loại sản phẩm và sản lượng khai thác - Quang Long -

Loại sản phẩm và sản lượng khai thác									
Công ty	Số khai trường (vị trí) đang khai thác	Loại tài nguyên	Trữ lượng cho mỗi loại tài nguyên (2015)	Loại sản phẩm		Sản lượng khai thác (2013) m ³	Sản lượng khai thác (2014) m ³	Sản lượng khai thác (2015) m ³	lượng khai thác theo kế hoạch (m ³)
				Sản phẩm	Kích cỡ (cm)				
Quang Long	1	<ul style="list-style-type: none"> Basalt Đá xây dựng 		Basalt	10-50 cm	0	0	0	0
				Basalt	4-6 cm	0	0	0	0
				Basalt	2x4 cm	2000	3000	2500	2000
				Basalt	1x2 cm	180000	190000	190000	195000
				Basalt	0,75 cm	18000	15000	12500	13000
				Basalt	0-0,5 cm	20000	12000	15000	10000

Bảng 3. Loại sản phẩm và sản lượng khai thác - Trung Sơn -

Loại sản phẩm và sản lượng khai thác									
Công ty	Số khai trường (vị trí) đang khai thác	Loại tài nguyên	Trữ lượng cho mỗi loại tài nguyên (2015)	Loại sản phẩm		Sản lượng khai thác (2013) m3	Sản lượng khai thác (2014) m3	Sản lượng khai thác (2015) m3	lượng khai thác theo kế hoạch (m3)
				Sản phẩm	Kích cỡ (cm)				
NHÀ MÁY XI MĂNG TRUNG SƠN	2	Basalt Đá vôi làm nguyên liệu sản xuất xi măng/ Limestone for cement production		Basalt	10-50 cm	40.000	190.000	500.000	443.000
				Basalt	4-6 cm	30.000	15.000	10.000	Tận dụng đá không thể sử dụng làm nguyên liệu thô cho sản xuất xi măng
				Basalt	2x4 cm	35.000	20.000	12.000	
				Basalt	1x2 cm	25.000	15.000	10.000	
				Basalt	0,75 cm	10.000	7.000	8.000	
				Basalt	0-0,5 cm	15.000	8.000	12.000	

Table 4. Purpose of usage -Hợp tiến-

Tỉ lệ Sản phẩm (2015) được phân phối cho từng loại khách hàng (%)		Tỉ lệ sản phẩm (2015) phân bổ trực tiếp được sử dụng cho mục đích...(%)						Khối lượng từ các hoạt động khai thác không được sử dụng, bỏ lại trong năm 2015)	Khối lượng từ các hoạt động khai thác không được sử dụng, bỏ lại (năm 2014)	Khối lượng khai thác không được sử dụng, bỏ lại (2015)
Bán lẻ	Công ty vật liệu xây dựng	Công ty xây dựng	Xi măng	Trộn bê tông	Sử dụng cho làm đường	Sử dụng làm	Mục đích khác			
	x			x	x			0	0	
5	10			80	10			0	0	
		x	x	x	x		x	0	0	0

Hợp tiến
Quang Long
Trung Sơn

Nhận xét: Không có đất đá thải bỏ \longrightarrow được tái sử dụng ?

Table 5. Products delivered to customers outside Hoa Binh

Khối lượng bán cho khách hàng tại các tỉnh năm 2015 (Hợp tiến)												
	Hoa Binh	Ha Noi	Son La	Phu Tho	Vinh Phuc	Thai Nguyen	Bac Giang	Bac Ninh	Hung Yen	Ha Nam	Ninh Binh	Thanh Hoa
Hợp tiến	5%	95%										
Quang Long	10%	80%						5%	5%			
Trung sơn	30	35	5	12	15,4	1	0,5	0,5	0	0,5		0,1

- Common Market is Hanoi
- Markets for Hop Tien, Quang Long: Hanoi (80-95%) and Hoa Binh
- Trung Son: 2 major markets are Hanoi (35%) and Hoa Binh (30%)
Others: 25% (including 15% of Vinh Phuc)

2.3. MFA approach proposed to mineral mining industry as building material in Hoa Binh

Approach: From simple to complex

- Material flows from mining to consumption
- Material flows from a production facility (processing plant)
- Material flows at consumption place

Approach 1

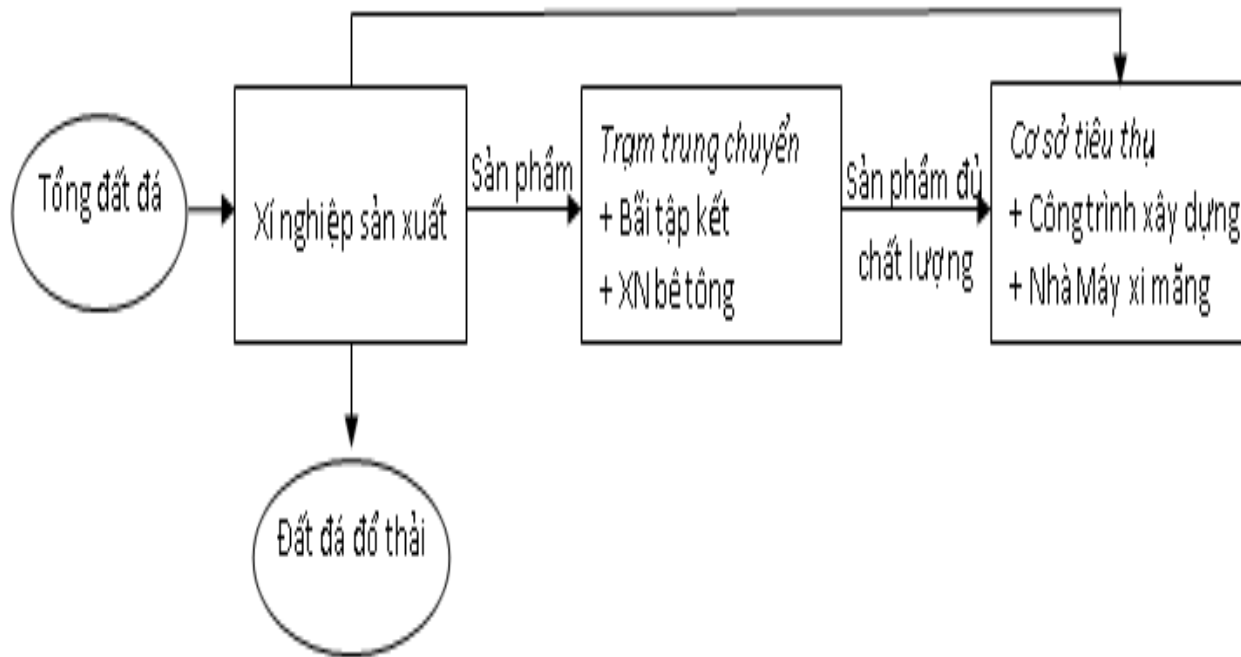


Figure 1- Diagram illustrates the material flows from **mining sites to consumption**

Approach 2

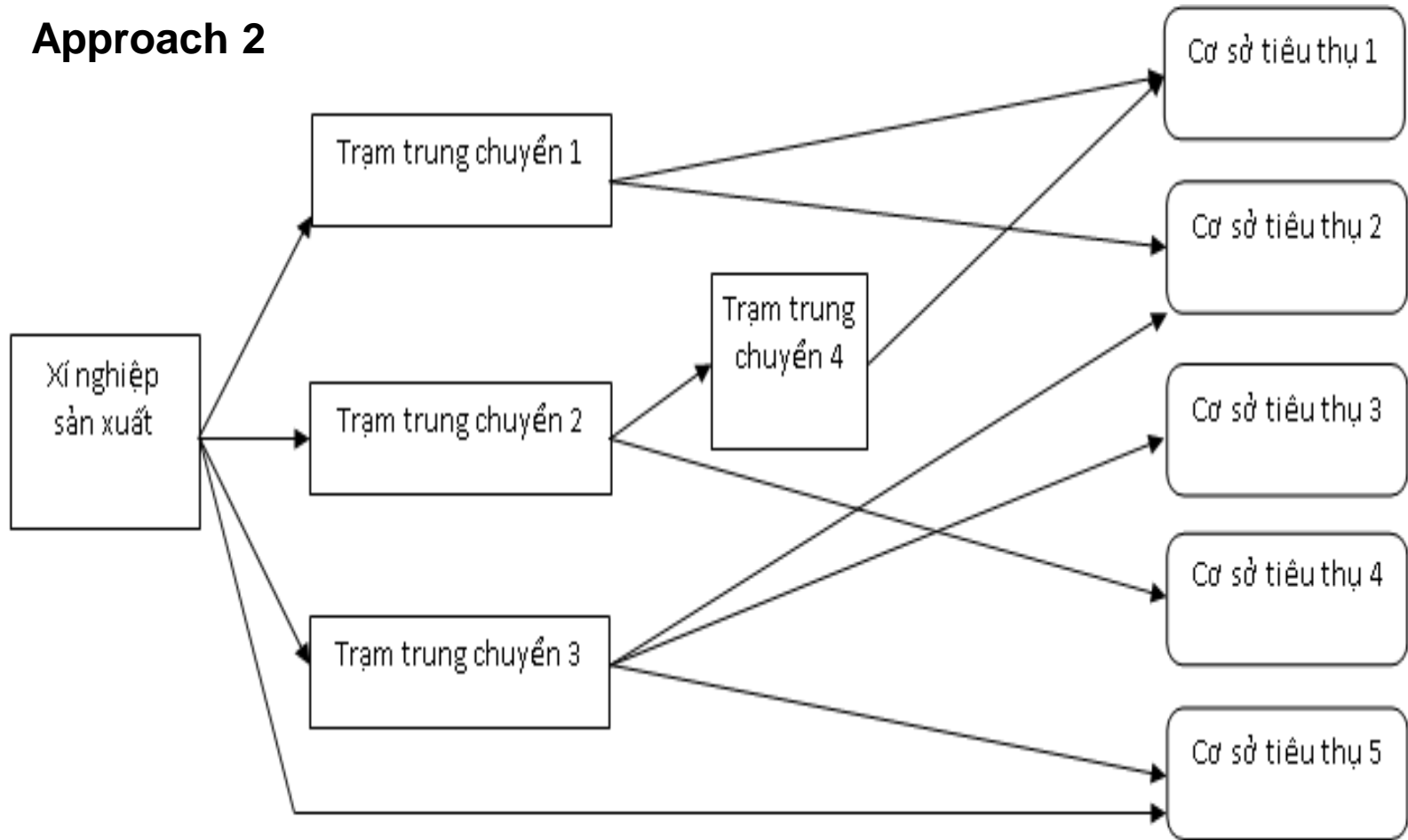
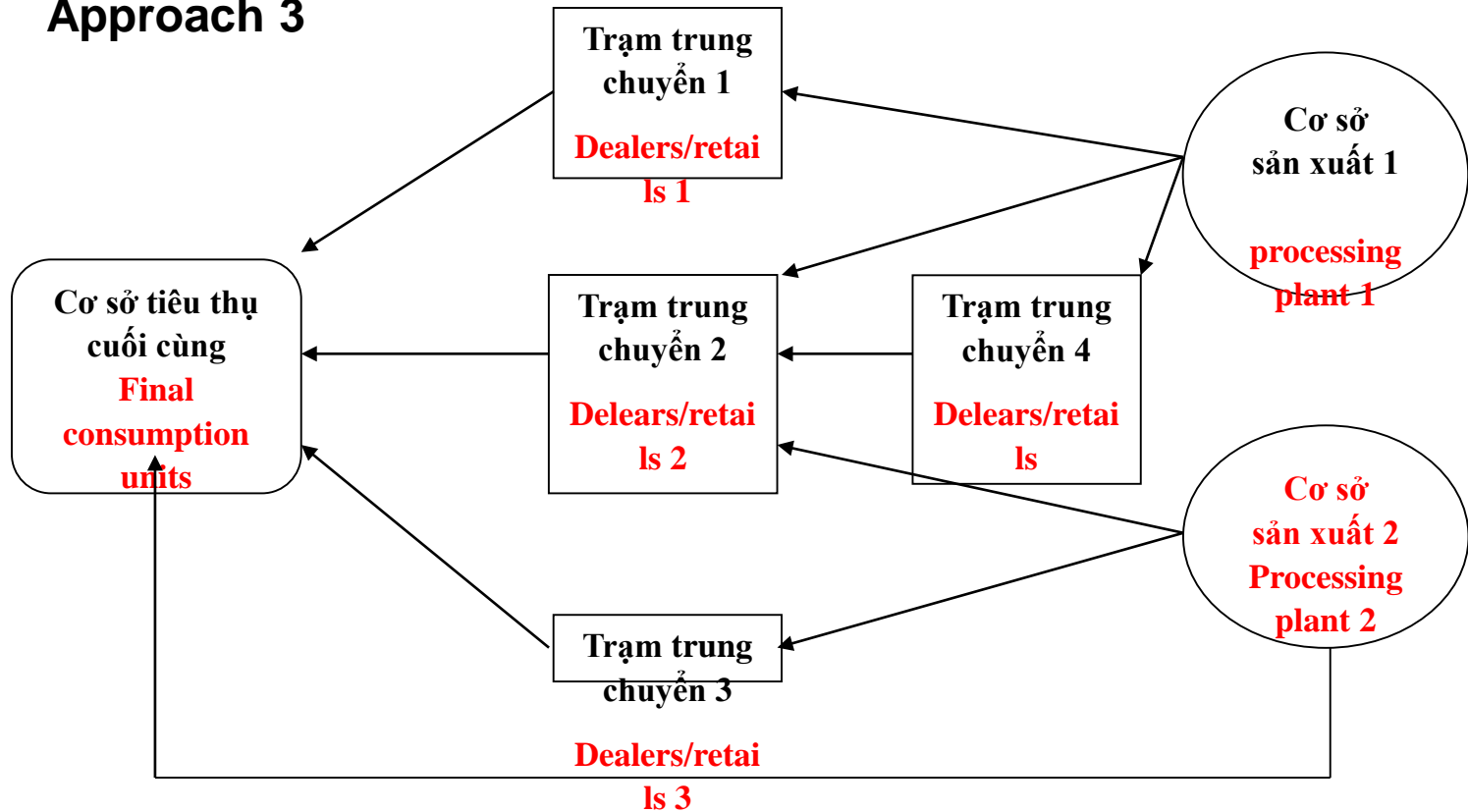


Figure 2: Diagram illustrating material flows from a production plant

Approach 3

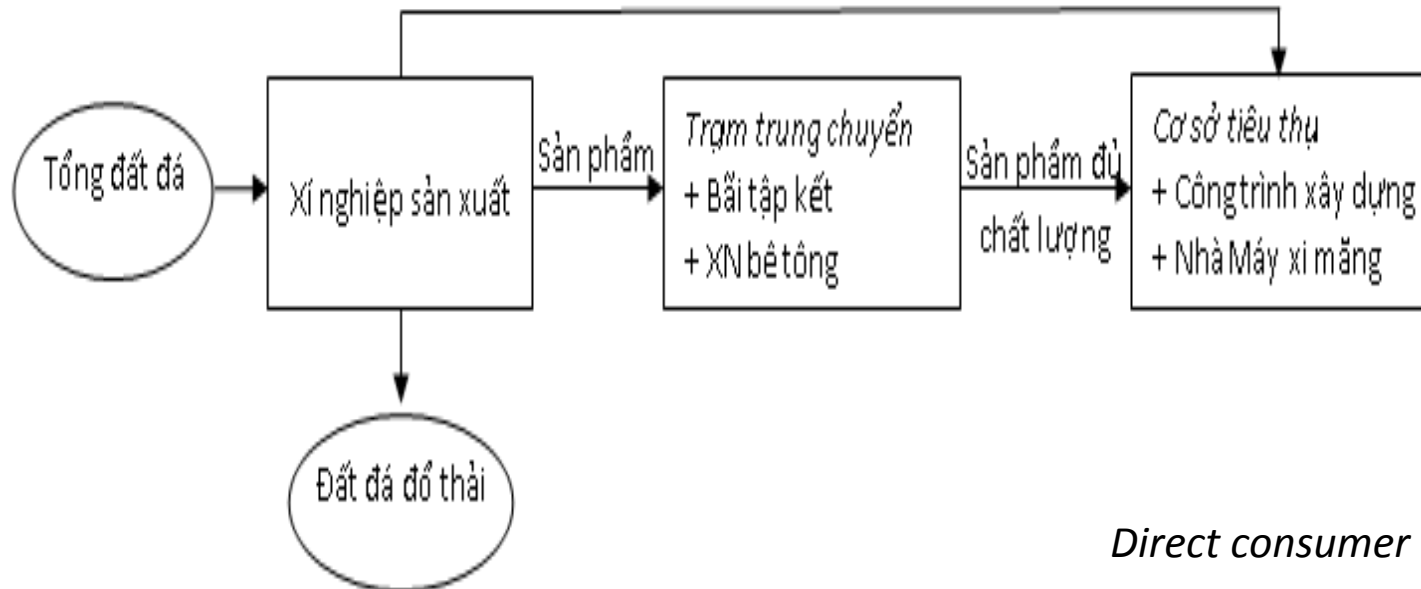


Hình 3. Sơ đồ minh họa dòng vật chất tại 1 nơi tiêu thụ

Có thể sử dụng để dự báo nhu cầu vật liệu xây dựng

Figure 3. Diagram illustrating MFA at a consumption location – to be able to used to forecast the demand for building materials

Approach 1. Simply model



Data of facility

- The address, coordinates of production site
- Production technology
- annual total volume of rock for excavation and blasting
- Name and address of customers

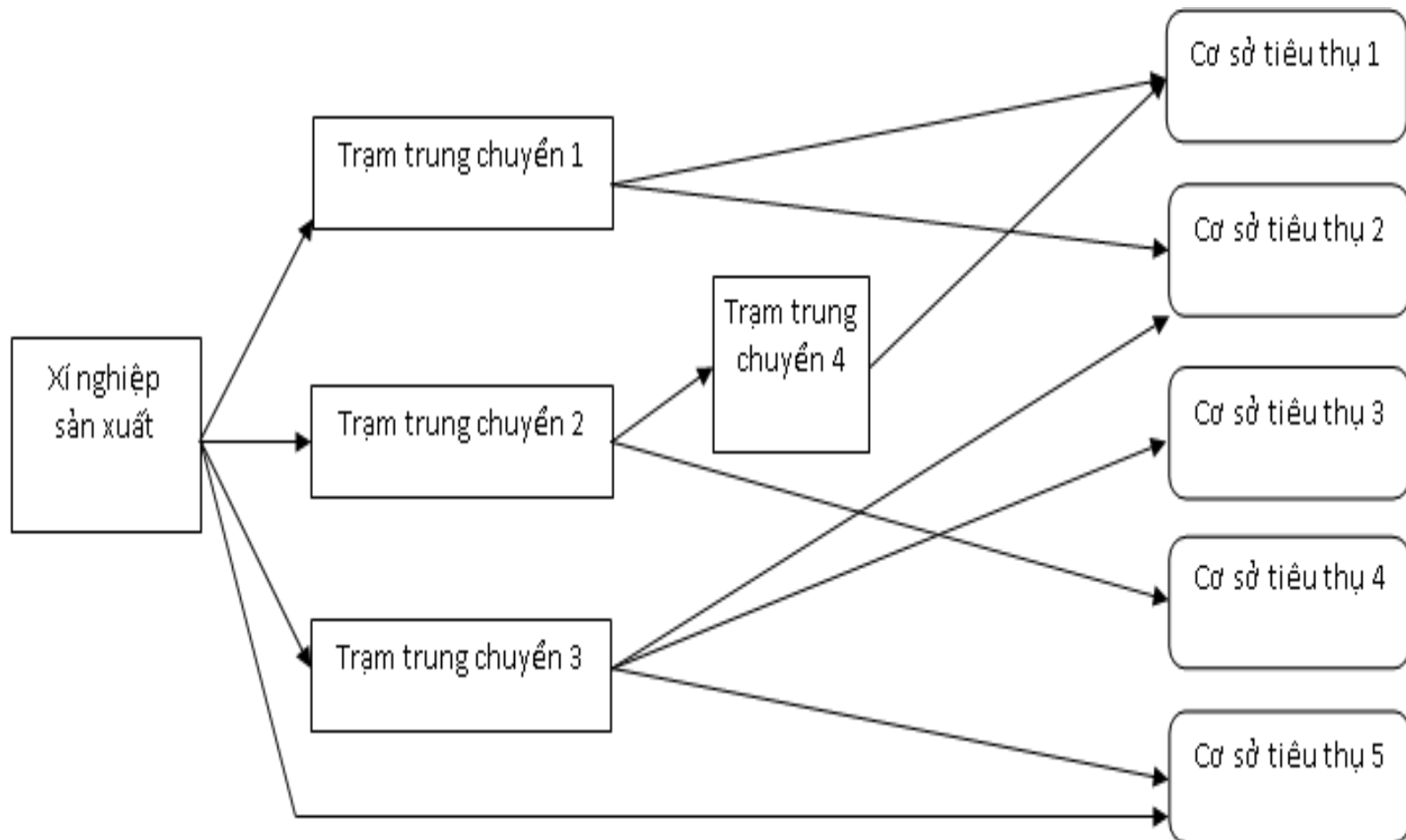
Information of transfer locations:

- Name, address, coordinates
 - Scale (storable place, concrete production capacity, first dealers/ retails)
 - Name and address of the next /sub consumer.
- Annual shipping volume to other facilities

Direct consumer base

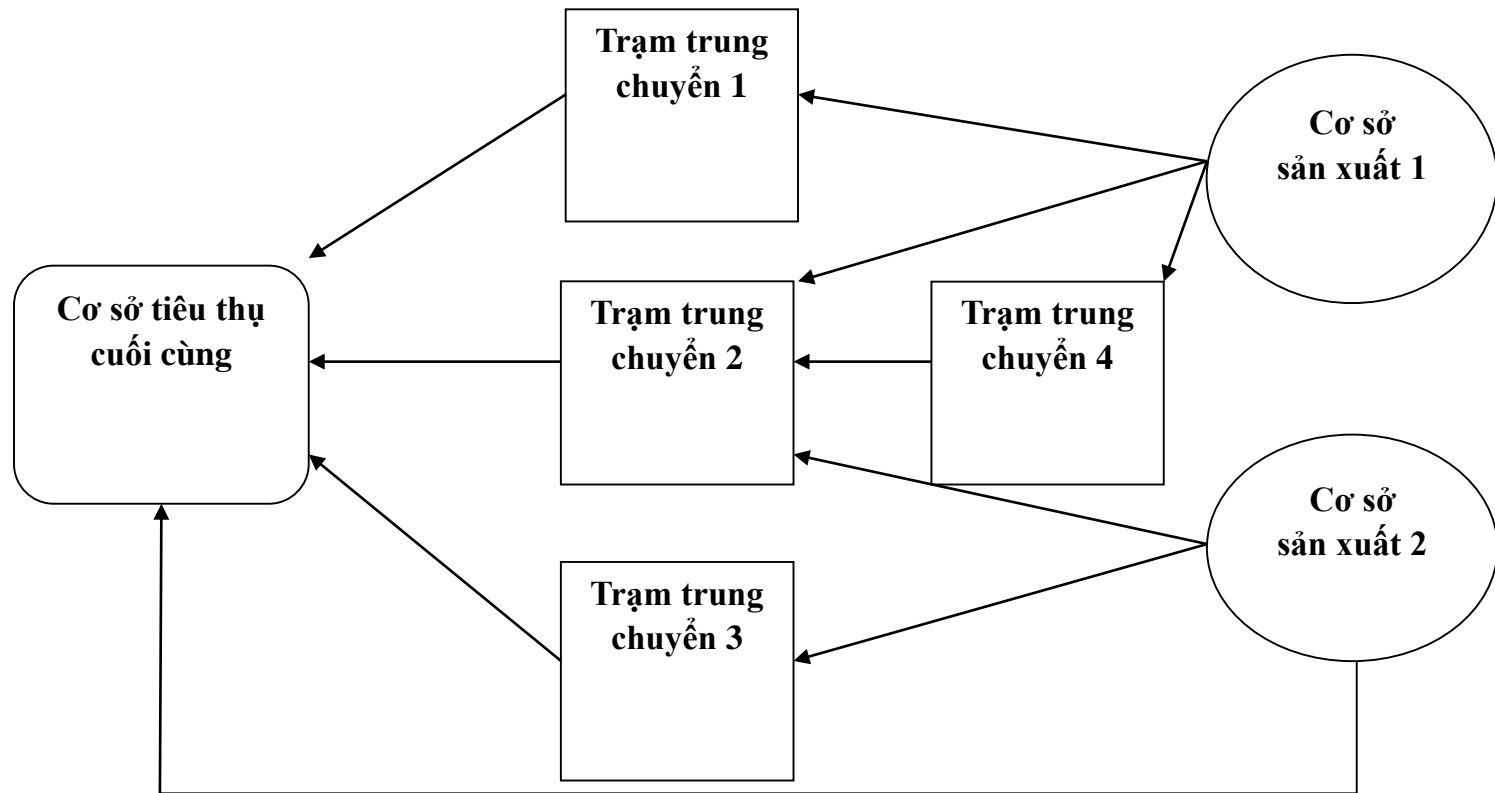
- Name, address and coordinates grassroots
- Type of construction material used (traffic works, buildings, apartment ...)
- Scale of works/buildings
- Estimation of annual consumption of materials (work progress)
- Estimated time of completion of works

Approach 2: The material from a production site



Problem of material balance of 3 manufacturing facilities in Luong Son based on this approach

Approach 3: The material at the place of consumption



- Integrated approach of 1 and 2
- For forecast of demand and supply of building materials for a large area (such as a region)
- Large scope: Hanoi, Hoa Binh

Example of the urban planning of Hanoi

Overall planning of Hanoi up to 2030, vision to 2050

in 2030:

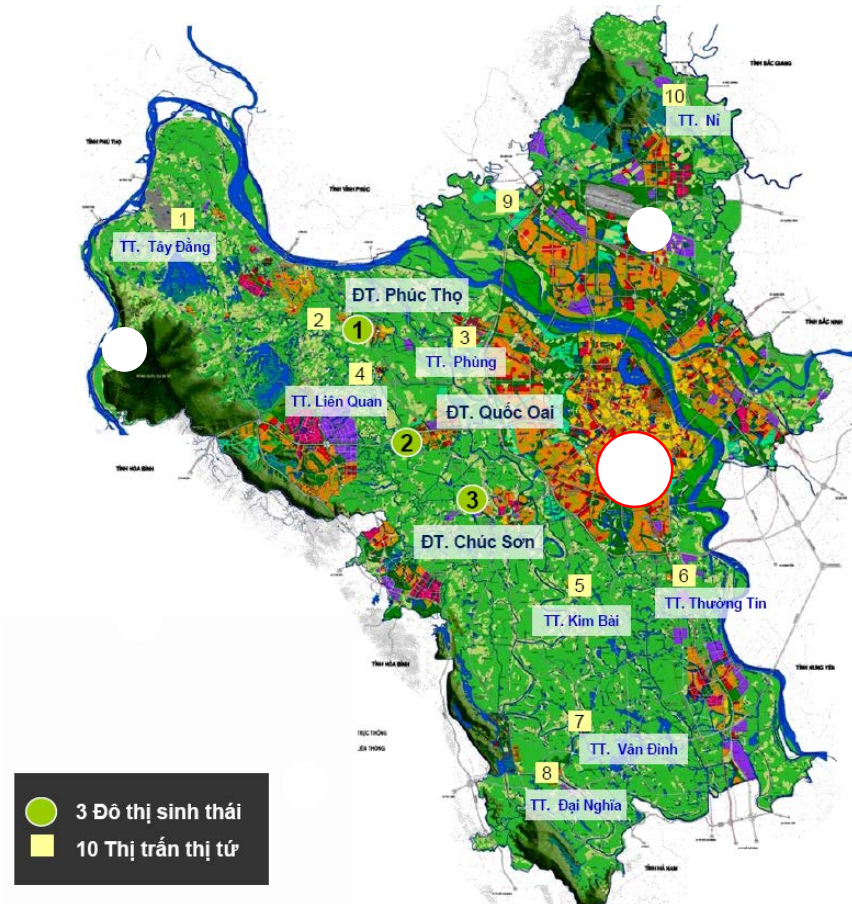
Population: 9.0-9,2 million

Urbanization rate: 68%

in 2050:

Population: 10.73 million

Urbanization rate: 70-80%



The Example of planning for megacities of Nhat Tan, Hanoi



Demand for building materials will get stronger

3. Some issues to be considered when calculating the MFA for construction material mining industry in VN

1. **Situation of providing data/information**

- Statistical data: limited due to storage of data has not been focused
- Estimated cash flows can help to estimate material flow but hardly public by business
- Survey: incomplete data, lack of data
- Data source: mainly provided by facilities
- Difficulties in approach with data sources without writing official document by authorities

Difficult to define specific material flow data from the production site to the final place of consumption (because of the present of transfer station)

2. Issues needs considering when implementing MFA

A. For the problem of the current material flow : based on the approach of

- Need to determine the amount of building materials from the production (eg from Luong Son, Hoa Binh)
- Where to be processed and provide to
- Knowing material flow from transfer locations (dealers), we can approach direct and final consumption of material which is manufactured from the facilities in Luong Son

B. The Problem of models for forecasting building material balance

1. The forecasted data for supply and demand needs to be done

- ***For supply sources:***
 - Estimating available production supply of facilities through fieldwork, production plans according to the EIA report, ...
 - Forecasting data of production supply of facilities which will be built and operated in the future through geological data, their development plan
- ***For demand sources:***
 - More difficult to identify; survey in detail needs doing to get reliable data
 - Identifying survey areas (e.g. for building materials from Luong Son, just survey Hanoi area)
 - Identify the transfer locations (main dealers/sub-dealers/retails) and consumption locations
 - Knowing well the information about where the building materials come from
 - Annual consumption quantities/amount of materials
 - Development orientation in the coming years
 - Disadvantages: not easy to approach data sources from dealers/retails/final consumption customers.
- There should be a written official document from the administration for providing data

2. Identify input data for MFA based on Integration with the regional and regional development planning

- In the master planning of economic and society development of Hanoi up to 2020 and vision to 2030, programs and projects as priority investment has been showed in annex 4, including program of infrastructure development (transport, electricity, irrigation, ...); housing and urban development (new urban areas, satellite urban areas, renovated old buildings, ...); industrial and handicraft development with the new construction and renovation of industrial zones up to 2020 and orientations to 2030 as well as a number of other programs (indicated in detail in Annex 2).
- Demand for building materials will certainly be very high
- Based on building criteria's, evaluation of the needed amount of building materials for the implementation of the above program can be done.

3. Display data on digital maps (using GIS): Forecast demand for building materials and other needs to meet plan (require a big budget)

Xin trân trọng cảm ơn!

Thank you very much!