

MINISTRY OF EDUCATION AND TRAINING

MINISTRY OF CONSTRUCTION

HANOI ARCHITECTURAL UNIVERSITY

TRAN NHAT KHOI

**ARCHITECTURAL SPATIAL ORGANIZATION OF
AGRICULTURAL PRODUCTS AND FOODSTUFFS
WHOLESALE MARKET TO BE SUITABLE FOR HANOI
URBAN**

MAJOR: ARCHITECTURE

CODE: 62.58.01.02

SUMMARY OF DISSERTATION

Hanoi - 2019

This dissertation has been completed at
Hanoi Architectural University

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Reviewer 1:

Reviewer 2:

Reviewer 3:

The dissertation will be defended at university-level council for
dissertation grading, in Hanoi Architectural University,
at.....o'clock, date.....monthyear.....

The dissertation can be found at the National Library and
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INTRODUCTION

1) The necessity of the dissertation topic

Hanoi is in the process of strong urbanization, the population is rapidly increasing in the central city and 5 satellite cities, requiring a correspondingly developed social infrastructure system. The wholesale market (WSM) of agricultural products and foodstuffs (APF), which plays a role in serving the daily needs of the city, is also subject to strong changes.

However, the practice of APF WSM's architecture development is currently facing with the following issues: Quickly backward position; Scale and land fund have not been calculated appropriately; Planning and architecture have not approached the right needs; Architectural space (SP) and function are asynchronous; Not uniform in classification, investment or management.

Therefore, the dissertation chooses the topic "*Architectural spatial organization of agricultural products and foodstuff wholesale market to be suitable for Hanoi urban*" for research, in order to propose solutions to develop the architectural morphology of APF WSM to be suitable for Hanoi.

2) Research purpose

- a. *Research Aims:* Researching architectural spatial organizing (ASO) solutions for APF WSM to be suitable for Hanoi urban.
- b. *Research Objectives:*
 - Clarify issues about the position/location of APF WSM in the Hanoi market building network; classifying /ranking APF WSM;
 - Proposing the principles of scale calculation, functional isolation and ASO solutions for APF WSM, oriented to modernity, efficiency in use, meeting the development needs of Hanoi
 - Proposing principles for managing the APF WSM of Hanoi; supplement Standards and Regulations.

3) Research subject and research scope:

- a. *Objects of the study:* spatial structure, functional structure and

architectural morphology of APF WSM.

b. *Research Scope*

- In terms of space: APF WSM architecture in Hanoi according to the Master plan of Hanoi extended to 2030, vision to 2050;
- Regarding time: until 2030.

4) Research methodology: survey method; Statistical and comparative methods; Aggregate Analysis methods.

5) Research content:

- Development process; separating APF WSM from usual markets; determine the role of the APF WSM network and building;
- Gathering Scientific bases for ASO of APF WSM
- Classify and identify the APF WSM network;
- ASO's principles and solutions for APF WSM;
- Management solutions and supplementing regulations / standards.

6) New contributions: (1)separate the category of APF WSM; (2)Built up ASO's principles; identify specific functional space (10 components), functional ASO diagram of Hanoi APF WSM; proposing calculating method of land scale, building scale and building density; (3) Categorizing (3 categories), classification (6 levels); Proposing APF WSM network to be suitable for Hanoi urban development; (4)Proposing ASO solutions for APF WSM according to the levels of functional spaces; (5)Proposing management solutions; recommendations to supplement regulations / standards.

7) Scientific and practical significance:

- Theoretical value: adding new theoretical knowledge about architectural design of APF WSM building;
- Practical value: reference for architects in the work of consulting, designing APF WSM in other provinces.

8) The structure of the dissertation: Besides the introduction and conclusion, the thesis content includes 3 chapters;

CONTENT

Chapter 1: OVERVIEW OF MARKET AND AGRICULTURAL PRODUCT AND FOODSTUFF WHOLESALE MARKET

1.1 General describe of wholesale markets in the world

The market is closely linked to the urban development process of each country. The need to use APF is a critical human need. APF WSM exists independently and in parallel with other types of commerce; developed countries upgrade and implement existing

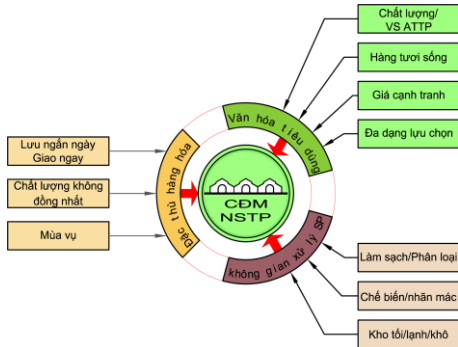


Figure 1.5: Characteristics of APF WSM in a trading system

markets; building and expanding in developing countries. The general development trend is high technology application; Combined with logistics and other auxiliary functions.

1.2 Development process of markets and agricultural product and foodstuff wholesale market architecture

1.2.1 The establishment and development of markets in Hanoi

Formed and developed through the feudal period, modern period, to the Doi Moi period (1986), Hanoi urban area as well as the market system tend to be complex and expand rapidly. The main / large market system constantly moves into new urban borders.

1.2.2 Agricultural product and foodstuff wholesale markets in Hanoi

In modern era, Hanoi market network fluctuates in parallel with urbanization process; developing at a new level with an expanded operating radius, diversified products, new ways of doing business, ... creating a turning point in shaping the network of WSM

In 2005, Hanoi has 9 main markets; The term in classification with was not used until 2008. In 2008, Hanoi and Hatay merged, there were 6 agri-food WSMs and 16 first-grade markets. In 2011, Hanoi Master Plan was approved, with system under Trade infrastructure network.

1.3 Current situation of APF WSM architecture in Hanoi

To solve the set objectives, the survey is based on the following criteria: 1)Location; 2)Traffic conditions and other technical infrastructure; 3)Functional chains and market ASO; 4)Management work; 5) Operational efficiency; 6)Trends to adapt to new needs.

Survey subjects were 8 markets that played the role of APF WSM in Hanoi during periods: 1)Dong Xuan Market, 2)Nghe Market, 3)Minh Khai Market, 4)Bac Thang Long Market, 5) Den Lu Market, 6)Van Dinh market, 7)Ha Vy poultry market , 8)Long Bien market.

The survey shows that the operational efficiency is not high, as:

About Planning spatial organization:

- Location: Backward to urban development speed;
- Connection traffic: unreasonable intersections, ineffective in supplying goods to the distribution system.

About Architectural spatial organization:

- The ASO of master plan is not reasonable, does not determine the right subjects and how it works. The system of warehouses, yards and processing is not adequate / sufficient.
- Main building market: small stalls are only suitable for trading and displaying product samples, failing to fulfill the role of the main operating space; Main activities of the market are located at the outdoor trading ground, affecting transportation, adversely affected by climate & weather; Indoor space does not ensure necessary ventilation.
- Environment: have not overcome the disadvantages.
- Culture: The assessment of lifestyle factors as well as business traditions is unrealistic

About Management: has just appeared in the management system since 2008, there is still no uniformity in approach from parts

1.4 Scientific research works related to the dissertation's topic

1.4.1 Vietnam.

- In the field of architecture, there have not been any studies on APF WSM. The current architectural research of the Marketplace is mainly for the retail/distribution market system, not specifically for the category of wholesale markets with a wholesale factor; mostly classified in the same category in retail markets and 1st grade markets in general;

- Ministry-level scientific researches (the Ministry of Trade) determine that WSM is separate in the hierarchy of commercial buildings, belonging to commercial infrastructure; build up policies and solutions to develop APF WSM;

- Some research projects of other socio-economic sectors provide / synthesize theoretical tools on socio-economic geographic perspective, supplementing the studies on urbanization from perspective of planning and zoning commercial consumer / provider.

Planning projects of sectors for market or related to the market. However, there is a lack of interdisciplinary and backward development speed. The data and orientation of the projects are an important foundation for calculating and predicting the development of the APF WSM system.

Hanoi Master Plan to 2030 with a vision to 2050 - approved in 2011, is the basic database for the dissertation's studies.

1.4.2 World

Research documents around the world consider APF WSM to be the type of building at the top level (wholesale), located above the distribution system (retail market).

In general, there's no specific research on APF WSM architecture for Vietnam. Surveying/synthesis information in countries such as Thailand, Taiwan, HongKong, Singapore, Germany, Kazakhstan,

Australia,...,and cities like London, Bangalore.

Specific designs: Refer to the Hanoi WSMs surveyed; domestic and foreign WSMs with similar properties and sizes.

1.5 Issues for research

APF WSM is an indispensable building in the city. Currently, APF WSM is undergoing major changes to meet the needs of rapid urbanization in Hanoi. These are issues related to network planning, ASO, technical regulations / standards, and operational management.

Therefore, the main research issues set out in the thesis include:

- Summary of the development process of APF WSM architecture. Thereby distinguishing APF WSM from the regular market, and at the same time defining the role of the network as well as the APF WSM building in Hanoi urban development;
- Classifying and defining APF WSM network in Hanoi;
- Gathering scientific bases for ASO of APF WSM;
- Built up ASO's principles for APF WSM in Hanoi;
- Proposing ASO's solutions for APF WSM;
- Proposing management solutions, supplementing regulations and standards

Chapter 2: SCIENTIFIC BASIS FOR THE ARCHITECTURAL SPATIAL ORGANIZATION OF AGRICULTURAL PRODUCT AND FOODSTUFF WHOLESALE MARKET TO BE SUITABLE FOR HANOI URBAN

2.1 Theoretical basis

- Christaller's Theory of Central Location: The hierarchical market network is described in association with the hierarchy of the market, similar to the network of central locations. (Figure 2.3)
- Development trend of APF WSM to meet the needs of Hanoi urban development: moving from inside the city to outside; Having its own position and role in the goods supply system; forming large-scale public complexes with mixed functions for flexible use;

- "Green" architecture / Sustainable architecture with elements of "Local" architecture is a suitable trend for APF WSM Hanoi.

2.2 Factors affecting ASO of APF WSM in Hanoi

2.2.1 Market and rule of supply and demand

The APF commodity market is a commodity instant delivery market; in the relationship of *Demand - Supply*: Demand always comes first, from which there is Supply. The market network appears in parallel with the smooth operation of the market.

- Characteristics of Demand - Supply: Hanoi is a consumption region not a key agriculture region.

2.2.2 Trade level, mode and capacity of APF circulation

For Hanoi, it is typical: small-scale retail, with facilities scattered throughout the city; Supply sources for the retail system are inadequate and unstable; limitative traffic network

2.2.3 Natural, cultural and social factors

- Natural climate of Hanoi: humid tropical monsoon moisture
- Cultural and social features: Agricultural native culture.

2.2.4 Technical and technological factors

Modern techniques and technologies can deeply influence the ASM's operating structure and language of expression

2.3 Legal basis

2.3.1 Laws and policies of Hanoi City

Decree No. 02/2003 / ND-CP: gradually transferred to enterprises or cooperatives selected through tender. In 2012, Decision No. 5058 / QD-UBND Approving the planning of wholesale and retail network in Hanoi City to 2020, with orientation to 2050.

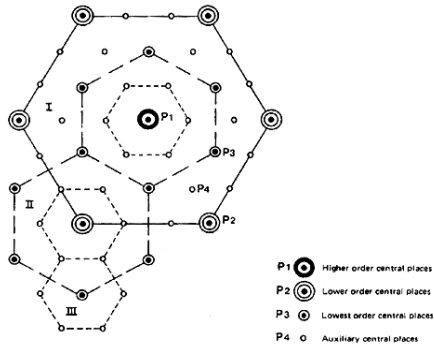


Figure 2.3: Market Network - Central Location Theory.

2.3.2 Standards, Regulations for design

- *Market design standards*: mainly based on TCVN 9211: 2012. There are 3 classifications of markets (level 1/2/3 markets); not deeply research for APF WSM type; approaching the Marketplace as the public architecture with the function of mainly Buy and Sell, making the calculation of market size and market ASO according to the number of "users" - including sellers (number of business points and area per stall) and the buyer (guest traffic organization); has not approached the Marketplace as a component of the market with the flow of money - goods circulating in period and space.

- Relevant Standards and Regulations: (Appendix 6)

2.4 Practical basis in Hanoi urban planning (UP) and development for APF WSM

2.4.1 Previous Hanoi UP project and urbanization process

- Hanoi UP before expansion -UP 108 (1998): backward rapidly, not keeping up with urban growth and urbanization process

- Hanoi Regional Planning: Hanoi is located in 2 international development corridors and is a peak of the inter-regional development quadrilateral. Key economic region with Hanoi Tonkin plays a central role.

2.4.2 Master Planning - 2011

Oriented development of the Hanoi Market and APF WSM (Figure 2.10): Establishment of a regional integrated agri-food WSM network in 5 areas, totaling about 150 ha.

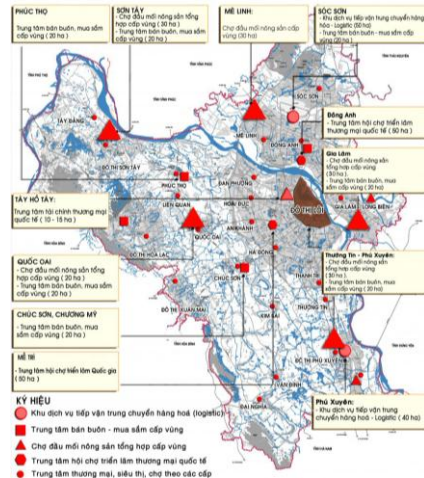


Figure 2.10: Master planning of trade and service system - Hanoi Master Plan - 2011

2.4.3 Trade Infrastructure Planning - 2007

The Ministry of Trade has specific views on the development planning for markets of level 1 and WSM.

Ministry of Trade's planning 2007 was prior to Ministry of construction's UP 2011 - but it was not relevant / inconsistent..

2.4.4 APF WSM in relation to urban

For small or satellite towns, APF WSM can be at the same time the city's central market. For medium cities, large or very large cities, APF WSM is located at the gateway to urban areas, operating in interconnected networks..

2.4.5 Practice of architectural spatial organization of APF WSM

- *In the domestic*: Ho Chi Minh City will form 3 combined APF WSMs and 19 APF WSMs; The planning is attached to the production region in 3 directions: East, North and West. South Central region: there are 25 agricultural WSMs.

- *International*: Europe and Australia tend to invest and exploit APF WSM in a large and modern scale, located outside the city. Africa: Most still do not have WSM, only South Africa has 15 national-level WSMs. Japan has a multi-level WSM network. India is a good example of developing WSM in developing countries; See WSM Bangalore.

- *Southeast Asia*: Thailand is a country with many similarities with Vietnam, with a large number of APF WSM.

2.5 Basis of architectural design, and APF WSM market today

Identified as a type of public building (belonging to the commercial building group). In TCVN 9211, the current APF WSM in Vietnam is still applied in the same way as 1st grade Market in the general market system.

Combine
with foreign
documents,
review and



Figure 2.13 Diagram of the main activities chain of APF WSM

evaluate the market architecture design base in general and APF WSM in particular in Vietnam according to the following components:

- *Building site*

- Planning and location of market's site;

- Basis of market size: Currently calculated by Business stall

- *Functional parts in the Market and APF WSM*

- Functional space types: not yet specific for APF WSM, so it is not suitable for the specific operation. (Figure 2.13)

- Functional flow diagram of APF WSM (Figure 2.14)

- Aggregate documents and field surveys, list possible functions and services in APF WSM.

- *Design of architectural master plan:*

Requirements of design; Main market building and other roofed items; Outdoor trading yard;

Internal traffic and parking; Landscape, green tree

- *Design of the Main market building's space:* Business locations (stalls); Indoor traffic space; Service business space; Other spaces in Main Market building

- *Design of functional ancillary spaces:* Warehouse; Parking area (parking space; Garbage collection and treatment; Functional technical space; Other auxiliary functional spaces.

- *Technical infrastructure system: Requirements & design solutions*

- *Requirements on architectural structure and finishing work*

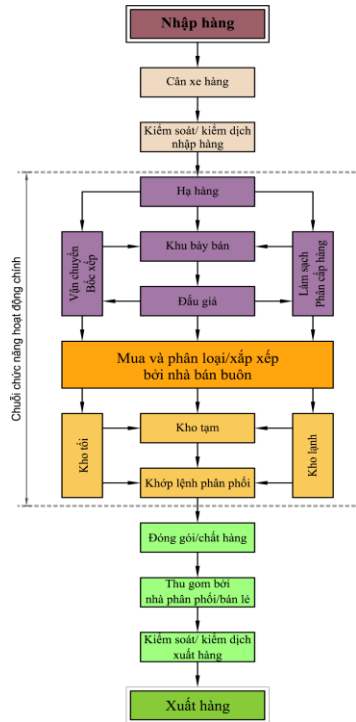


Figure 2.14: Diagram of functional activity-chain of APF WSM.

2.6 Experience with ASO of APF WSM

2.6.1 The investment's orientation for development of APF WSM

APF WSM's development is consistent with the trend of open & international economic integration, with types of modern commerce.

2.6.2 Network of APF WSM building

Most countries are developed based on the available market network, investing in upgrading infrastructure, factories,...

2.6.3 Operational management

In terms of management of APF WSMs in other countries, there are differences that Vietnam can refer to.

2.6.4 The scale

Aggregate analysis of documents in the world show that the size of APF WSM is calculated based on the annual flow of goods. The international average is about 3-4 tons / m² / year for the land,

and 15 tons / m² / year for the market building.

APF WSM serves the most effectively with urban residential areas with a population of 0.6-0.7 million and 1.0-1.5 million.

According to Table 2-11, considering the Hanoi APM WSM is the WSM format, the area

of the market is calculated to be 10-15 tons / m² / year; The estimated land area is 3-4 tons / m² / year.

Table 2-11 Area Criteria Main market building for APF market is based on annual freight volume.

Loại chợ	Lưu lượng hàng hóa
	(Tấn/m ² /năm)
Chợ nông sản rau quả ngoài trời (nông thôn)	5
Chợ rau quả ngoài trời (đô thị)	5 - 10
Chợ bán lẻ rau quả trong nhà (đô thị)	15 - 20
Chợ thực phẩm tổng hợp (rau, quả, cá, thịt) (đô thị)	10 - 15
CDM kết hợp bán lẻ thịt, cá, trứng	5 - 15
CDM kết hợp bán lẻ rau củ quả	10 - 15
CDM đô thị tổng hợp	20 - 30

Table 2-14: Comparing the proportion of functional space components. Source: Summary

	Loại chức năng trong Chợ	Tỷ lệ % sử dụng đất					Trung bình
		Kalimanti	Sansai	Teipei	Bình điển	Đền lữ	
1	Bãi đậu xe kết hợp bãi giao dịch ngoài nhà	21,00	11,24	32,2	31,73	14,18	22,07
2	Chợ bán buôn trong nhà	17,70	7,03	49,8	18,46	16,18	21,83
3	Kho hàng hóa	6,00	0,00	6,3	4,10		4,10
4	Dịch vụ phụ trợ	2,30	0,47	1,4	12,06	1,34	3,51
5	Văn phòng quản lý	2,80	4,68	6,7	1,48	0,65	3,26
6	Kỹ thuật phụ trợ	1,50	0,12		3,91	3,27	2,20
7	Công nghệ sản xuất phụ trợ	0,60	1,76	3,6	n/a	n/a	1,49
8	Không gian giao thông	29,20	29,92		15,37	32,50	26,75
9	Cảnh quan ngoài nhà	17,20	15,81		0,00	1,00	8,50
10	Đất dự trữ	1,70	28,98		12,90	30,89	18,62
Tổng diện tích khu đất (m2)		20.370	85.400	55.043	650.000	32.376	
Mật độ xây dựng (%)		28,80	12,18	64,20	36,10	18,16	31,89

2.6.5 Area of stalls

Aggregate analysis data of some countries in the world, comparing the correlation of Vietnamese conditions, the results are as follows: The average area of each APF stall is about $80m^2$, with a width of about $5m-7m$, depth of $12m-18m$.

2.6.6 Building density and proportion of functional components

Under the similar conditions, aggregate analysis comparative data, as a basis for experience on the area ratio of items and general building density of WSM (Table 2-14)

Chapter 3: ARCHITECTURAL SPATIAL ORGANIZING SOLUTIONS FOR AGRICULTURAL PRODUCT AND FOODSTUFF WHOLESALE MARKET TO MEET THE NEEDS OF HANOI URBAN DEVELOPMENT

3.1 Research perspective

The dissertation is based on the following research perspective:

1. Based on the operating rules of the market system with basis of Demand - Supply and operating characteristics of APM WSM type .

2. Taking the extended Hanoi Master Plan as a foundation.

3. Based on the basis of market architecture design and current technical regulations / standards, propose principles, models and solutions for ASO of APF WSM to be suitable for the Hanoi urban development process in the direction of modern, effective in using, to meet the needs of Hanoi's urban development.

4. In accordance with the public transport system connecting to areas supplying goods from production sources as well as distribution to consumption areas.

5. Meet the conditions of appropriate functional transformation in the urban development process.

6. Achieve the research objectives set out.

3.2 Proposing ASO's principles of APF WSM to meet the needs of Hanoi's urban development.

With these perspectives, propose ASO principles, considered as theoretical bases for the design, according to 7 principle groups:

3.2.1 Site selection

- Location of APF WSM: Time approach APF WSM maximum 30 minutes (see Section 2.2.2); flat terrain (slope of 1 - 4%), neat shape, not in flooded areas; avoid near residential areas or public facilities; It should be located near light industrial region.
- Access to traffic and other technical infrastructure: Need access to major roads; Has a gathering lane or split access point; Close to bus routes; infrastructure, connection, water supply.

3.2.2 Scale determination

Building Density: reaching 30% when completing the whole project is reasonable. Due to different development scenarios, when starting a project, the building density should be about 15% -20%; spend reserve funds for future plans. (see Table 3-1)

Propose *the basis for calculating the scale* of APF WSM in Hanoi city according to the turn-over:

- Sale-building area: 10-15 tons / m² / year;
- Land area: ~ 4 tons / m² / year.

The population of Hanoi is ~ 9 million, the average consumption of APF WSM is 200kg / person / year, which will require about 90 hectares of land for the APF WSM network.

If considering Hanoi as focal centers provides the Red River Delta, with a population of about 20 million people, the total land area would require about 200 hectares (as of coefficient overlap when WSM up-line for WSM down-line).

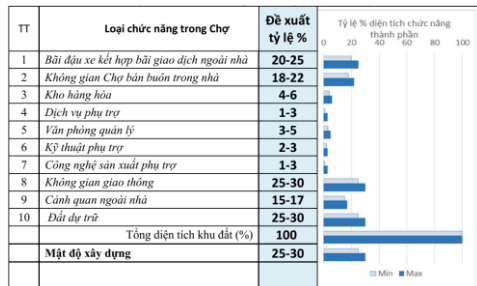
3.2.3 Functional spatial components in the building

Group functional components in 10 spatial groups:

1. *Parking area combined with outdoor trading area*
2. *Main market building (Indoor Wholesale Market Space)*

3. *Warehouse*
4. *Indirect service*
5. *Office - Management*
6. *Auxiliary techniques*
7. *Auxiliary Production Technology*
8. *Traffic space*
9. *Outdoor landscape*
10. *Reserve land*

Table 3-1: Percentage of functional spatial components



3.2.4 Architectural spatial organization of the building

The functional ASO diagram of APF WSM is more multi-dimensional complexity than the retail market. (Diagram 3-1)

3.2.5 Structure

Depending on the functional space group; Ensure multifunctional flexibility

3.2.6 Other technical issues

Taking urban infrastructure according to the planning as the

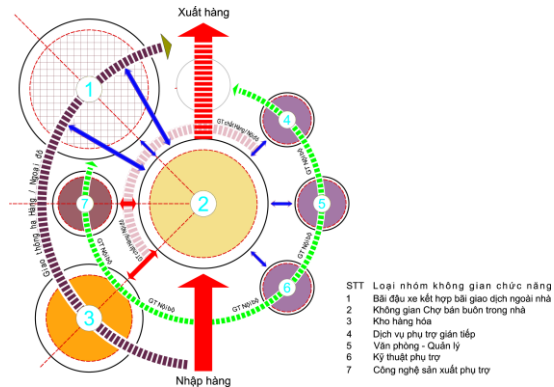


Diagram 3-1: The functional ASO diagram of APF WSM

foundation; Ready with development scenarios; Obey the general public building design principles; Ensuring hygiene and safety of food and the environment, ensuring the ability to control and fight against disease spread.

3.2.7 Management

Management according to boundaries In / Outside of the project.

3.3 Hanoi APF WSM network

- Categorizing APF WSM in Hanoi's network of markets: Divided

into 3 categories: 1) *Inside the city*, 2) *At the border of the city*, 3) *Outside the city*.

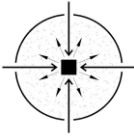


Figure 3.1: Category 1
– Inside the city.

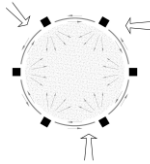


Figure 3.2: Category 2 –
At the border of the city

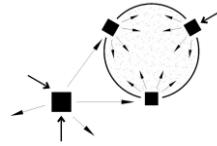


Figure 3.3: Category 3 – Outside
the city.

- Classification of APF WSM according to urban size: consists of 5 levels (Table 3-4): Level 1-2-3-4 and Regional level.

- Proposal of Hanoi APF WSM Network (Figure 3.5): organized into 10 WSMs, with 7 small /medium sized WSMs (level 2-3) and 3 WSMs at Regional level.

- Comparison shows: a moderate service radius of ~15km; hierarchical, connected by loops should complement each other; The west is served better; Centripetal and local service avoid traffic overlap; (Figure 3.6)

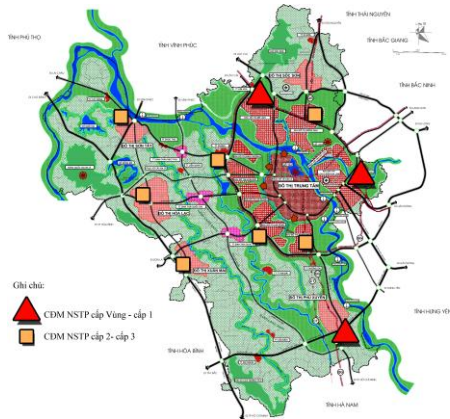


Figure 3.5: Proposal of Hanoi APF WSM
Network

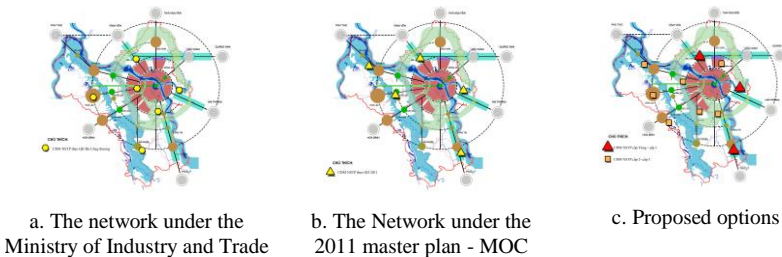


Figure 3.6: Comparison of network options

3.4 Solutions for ASO of APF WSM to meet the needs of Hanoi urban development

The research is theoretical basis; built up from core researches (Basic Stalls) to growing complex issues (Main Market building), towards the Master plan..

3.4.1 Solutions for architectural spatial organization of Basic stall

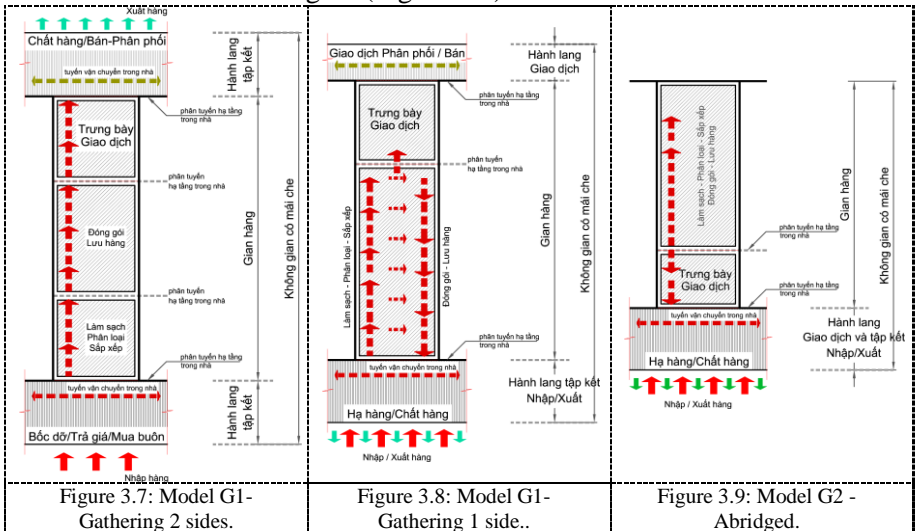
Where major commercial activities take place, forming the Main Market Building (MMB); associated with the operating space Unloading / Bidding / Wholesale and Sales / Distribution / Loading.

The size of each suitable stall is about 80m², with an appropriate width of about 5m-7m, depth of 12m-18m (see section 2.6.5)

Organized with 3 segments in order: 1) Cleaning / Sorting / Arranging → 2) Packing / Storing → 3) Display / Transaction..

Proposing 3 diagrams of the Basic Stall:

- Stall model G1 - gathering 2 sides: (Figure 3.7)
- Stall model G2 - gathering 1 side: (Figure 3.8)
- Stall model G3 - abridged: (Figure 3.9).



3.4.2 Solutions for ASO of Main Market building

Proposing 3 models of the Main Market building (MMB):

- *Main market building - Model N1 - Import / Export 2 sides*

Is the type with operating space of Import and Export goods are located on both sides of the MMB (Figure 3.10, 3.11)

Applicable to WSM of Regional level or level 1; with a large volume of turn-over; requires a large area of land; the location may be at the edge or outside the urban

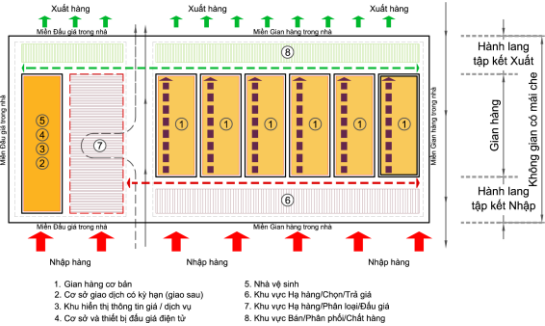
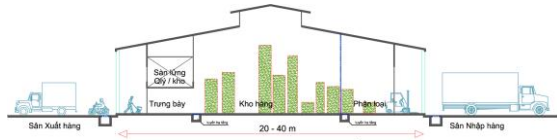


Figure 3.10: MMB – Model N1- Import / Export 2 sides

Figure 3.11: Cross-section solution of MMB Model N1, with Basic Stalls gathering 2 sides



- Main market building - Model N1 - Import / Export 1 side

Is the type that combines gathering goods space for both import and export activities (Figure 3.12, 3.13)

Applicable to medium and medium sized WSMs (level 1,2,3); The location should be at the border or inside the urban.

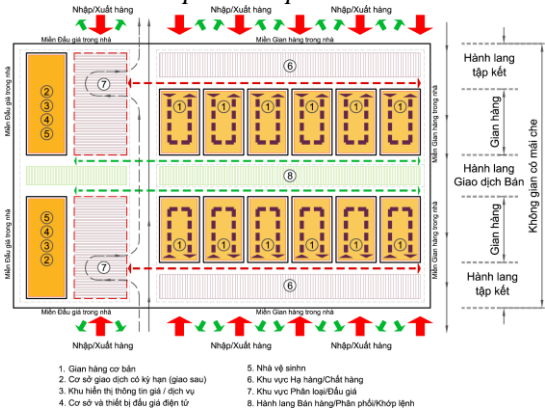


Figure 3.12: MMB - Model N2- Import / Export 1 sides

Figure 3.13: Cross sectional solution of MMB Model N2



- Main Market building - Model N3 – abridged

Is the type that does not separate the space for gathering goods, integrating transaction routes on the same corridor (Figures 3.14, 3.15)

Suitable for small or medium sized markets, (level 2,3,4); The location should be at the border or inside the urban.

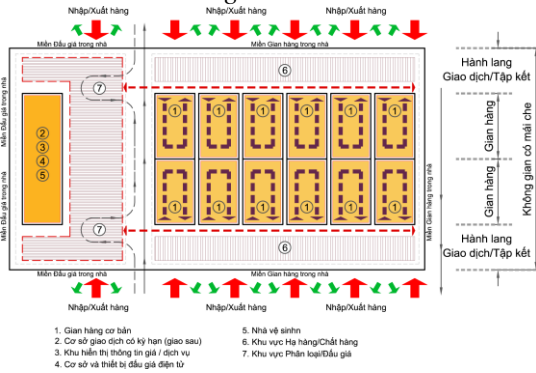


Figure 3.14: MMB - Type N3- abridged.

Figure 3.15: Cross sectional solution of MMB model N3

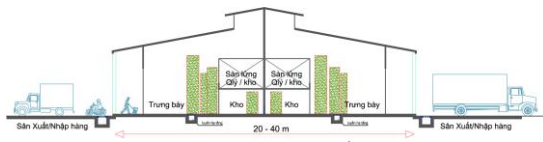
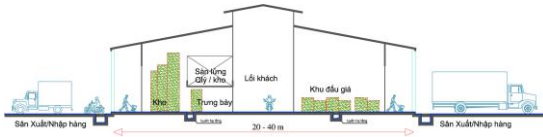


Figure 3.16: Cross sectional solution of MMB model with transaction methods combined



The combined cross-section solution (Figure 3.16), flexible in operation.

3.4.3 Solutions for ASO of APF WSM's master plan.

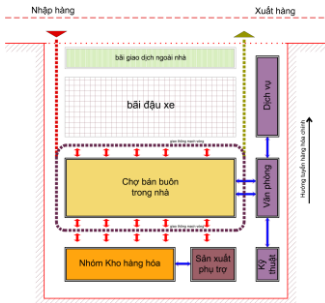


Figure 3.17: APF WSM's master plan. - Model T1 (1-direction approach)

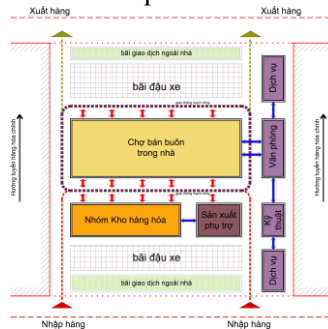
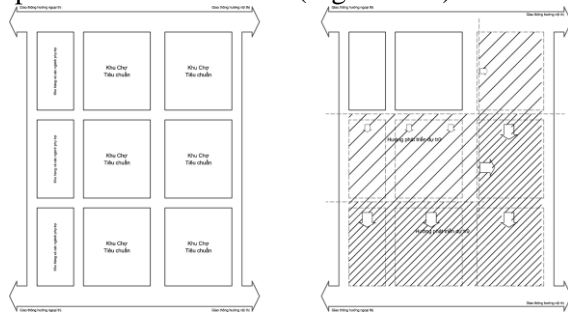


Figure 3.17: APF WSM's master plan. - Model T2 (2- directions approach)

divided in the reserve plots of the whole area. (Figure 3.23)

Figure 3.23: Solution Development Combined – direction of the development phases.



3.5 Design for illustration example

Select locations to design for illustration at Phung, the western-gate of central Hanoi, located at the intersection of road/rail/waterway traffic hub, medium scale. The region serves about 0.6 million people.

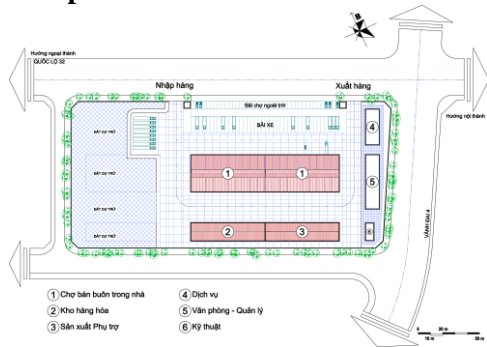


Figure 3.26: Master plan illustration example - horizontal development

- *Master plan*: selected according to Solution Horizontal Development (Figure 3.26); model T1. Block size of MMB (building No. 1) is chosen of 30m x 60m; auxiliary block (building No. 2 & 3) is chosen of 15m x 60m.
- *Main market building*: Model N2, 30m span, 6m column grid (10 grids), similar structure of 1-storey light industrial building type
- *Basic stall*: model G2 - gathering 1 side.

3.6 Proposal of APF WSM management solutions in Hanoi

- *Management of urban planning*: Build up development prediction based on the rule of Demand - Supply, quantify consumption demand by urban population size, determine the supply in line with the Regional Planning orientation; Planning investment segment

according to the urban development process.

- *Management of the architectural design*: Supplementing and adjusting the Design Standards / Regulations; presented in Table 3-6 (Total ground), Table 3-7 (Main market building space) and Table 3-8 (auxiliary facilities and technical systems).
- *Management of operation*: 1) Outside and 2) Inside of APF WSM.

3.7 Discussion

3.7.1 Extended applicability of ASO's principles of APF WSM

- In urban planning & urban/region commercial infrastructure planning
- In updating the standards / regulations designed
- In architectural design for APF WSM

3.7.2 Adaptability of the ASO of APF WSM model with agricultural products and food industry

- It is possible to continue studying specific details by isolating 4 main APF categories: Vegetables & Fruits - Cereal - Meat - Fish;
- Extended applicability for another Local/Regions.

3.7.3 The transformation of APF WSM architecture in the process of urban development

- According to the process, a leap in urban development should be cause of the location shift of APF WSM.
- When the APF WSMs are backward in location, there are different transformations: 1) Functional, 2) ASO

CONCLUSION - RECOMMENDATION

1. CONCLUSION

1) The dissertation has summarized the development process of APF WSM Architecture of Hanoi as well as in the world, over time phasing. Based on the identification of 6 criteria, the thesis has selected 8 APF WSMs in Hanoi to conduct surveys, assess the situation and identify outstanding issues of APF WSM architecture in Hanoi , thereby showing:

- APF WSM appears and develops in parallel with the city, directly affected by the economic urban resources as a urban creation factor. Therefore, it can be affirmed: APF WSM is always an indispensable building category in the modern urban;
- APF WSM is a type of wholesale market with specific characteristics specific to the regular market, newly introduced into the management system and networked activities closely related to the development of Hanoi; at the same time, it is one of motivation to promote urban development (urban creation factor).;
- The difference between APF WSM and regular retail market is considered in 3 aspects of planning, building architecture and operation management. In particular, the problem is that the current architecture does not fully meet the main sequence of APF WSM's activities: “*Unloading=> Choosing / Auction /Bidding => wholesale Buying=> sorting / packing / labeling => Distribution / Wholesale Selling => Loading*”, which is often skewed toward the distribution / retail as for a regular market.

2) The dissertation has gathered ASO of APF WSM scientific bases, including the following issues: Theory, design basis, and factors affecting APF WSM architecture of Hanoi.

3) The dissertation is based on 6 perspectives, built 7 ASO's principles for APF WSM Hanoi: 1) *Site selection*, 2) *Scale determination*, 3) *Functional spatial components in the building*, 4) *Architectural spatial organization of the building*, 5) *Structure*, 6) *Other technical issues*, and 7) *Management*; meet the requirements of Network Planning, ASO and Management of APF WSM.

With an emphasis on ASO of APF WSM, the principles have identified 10 specific functional spaces of APF WSM. On that basis clarifies the ASO diagram; pointed out calculating method of the land scale, building scale, area ratio of functional space groups as well as related structural and technical principles corresponding to functional space groups.

4) The dissertation has conducted classification and identification of APF WSM Hanoi Network. In terms of categorizing, corresponding to the position of APF WSM in relation to urban areas, it is divided into 3 categories: inside urban, at urban border and outside urban; Each type is considered with its own pros / cons and its relationship to the organization of 10 functional space groups. Accordingly, the classification of WSM according to urban size is conducted, as a basis for proposing a plan to determine the APF WSM Network suitable for Hanoi urban development..

5) From clearly identifying the main activity chain and the established Principles, the dissertation proposes ASO solutions for APF WSM sequentially for spatial levels 1) *Basic stall*, 2) *Market Main Building* and 3) *Master plan of APF WSM*. The proposed ASO solutions for the Basic Stall include 3 models of G1, G2, and G3; for the Main Market Building including 3 models N1, N2, and N3; for the Master plan include 2 models T1 and T2. These proposed solutions correspond to the operational situation of the main activity chain, ensuring compliance with the established Principles. Accordingly, solutions for the development orientation of reserved space is also proposed for horizontal / deep / combined development situations, be consistent with the characteristics of APF WSM.

6) APF WSM management solutions are also proposed in three aspects: Urban planning, Architectural Design, Operation; towards the supplement of design standards / regulations for the APF WSM category to match with the reality, supplementing the establishing / predicting steps for the scale in the Planning; architectural management inside / outside the building when operating.

2. RECOMENDATION

1) Regarding Hanoi's APF WSM Network:

- Need to re-evaluate the scale of APF WSMs, make development projections in 3 phases: 1 year, 5 years and 20 years;
- Identify potential locations in the urban area according to the

proposed evaluation criteria;

- It is recommended to establish APF WSMs in the network by applying small and medium scale, replacing large-scale markets that are not suitable for the form of small and medium business in Hanoi;
- With the APF WSMs that have penetrated deeply into the city, proposed the application of space clearance, transformation into a square, serving social and cultural purposes while preserving the trade identity of the urban..

2) Regarding architectural spatial organization of APF WSM:

- Recommend to applying the models of function and function groups, isolated in accordance with the proposed classification of APF WSM;
- Recommend to applying of the modularization of functional spaces, in accordance with the requirements of investment phases, to closely follow urban development projection;
- The proposed technical, landscape and environmental standards are high level but necessary for the sustainable urban development;
- The trends of sustainable architecture / green architecture are consistent with the current situation of APF WSM in Hanoi..

3) Regarding management:

- Regarding urban management: It is necessary to strictly implement urban management principles, especially urban environment and landscape issues; strengthen the management of spontaneous markets. Flexible in adjusting the scale and level of APF WSM;
- Regarding Architecture management: It is necessary to supplement standards and regulations specifically for APF WSM; Closely follow the actual use needs of the building, make timely adjustments.
- Regarding operation management: The method of socializing the management and trading of markets should be accompanied with appropriate discipline, avoiding the use of buildings for improper purposes. Closely supervise environmental and landscape issues together with Quarantine Management.

**List of published scientific works of the author
related to the dissertation**

1. Tran Nhat Khoi. *Some orientations in the place selection and building scale of wholesale market for agricultural food products in Hanoi*. Journal of Architectural Science and Construction - Hanoi Architecture University, No. 14, May 2014.
2. Tran Nhat Khoi. *Architecture of wholesale markets for agricultural food products in Hanoi*. Vietnam Journal of Construction , No. 6-2017.
3. Tran Nhat Khoi. *Architectural spatial organizing solutions for agricultural product and foodstuff wholesale market in Hanoi*. Architecture Magazine, No. 6-2018 & 8-2018.
4. Tran Nhat Khoi. *Calculation of land-use scale for agricultural product and foodstuff wholesale market in Hanoi*. Architecture Magazine, No. 7-2019.

