HIGHER INNOVATION CAPACITIES FOR PARTICIPATION IN HIGHER VALUE ADDED STAGES IN GLOBAL VALUE CHAINS: THEORETICAL ASPECTS AND SUGGETIONS FOR VIETNAM

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Abstract:

Firms participating in value chains would find opportunities and modes of learning to be affected by types of chain governance in the value chains they operate in. Therefore, the building of support policies for domestic firms in learning to enhance innovation capacities for participation in stages with higher added values in global value chains should be based on analysis and right identification of types of governance and modes of learning in conformity to types of global value chains.

This paper is focused on analysis of upgrading types in global value chains and demands of innovation capacities, types of governance and impacts to modes of learning of domestic firms. On basis of global analysis of some types of value chains in Vietnam, some suggestions are made for policies to support domestic firms to exploit better the learning capacities for their upgrading in global value chains.

Keywords: *Innovation; Value chain; Policy planning.*

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In actual trends of globalization, efforts during many recent years in various sectors help attract an increasing number of foreign firms. Here, many clients are large trading corporations of the world. Many world leading firms come to Vietnam for projects of investment and producing plants. This move of business makes Vietnam liste in global value chains in numerous important industrial sectors such as electronics, textile-garment, leather-shoewear, home furniture, agricultural products and etc., all making contributions to higher export values of Vietnam. However, up to now, the participation and benefits of domestic firms from global value chains remain limited, mainly being focused on simple fabrication operations for low value products. This leads to low added values.

As shown by many international studies, the Government plays important roles in pushing-up domestic firms to participate deeper in global value chains as well as to develop domestic value chains through supports by

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policy tools for higher innovation capacities. The building of innovation capacities is a long process of learning and accumulating knowledge which are affected by general business environments where firms operate in. For firms participating in value chains, opportunities and modes of learning get affected by types of chain governance in the chains they operate in. Types of chain governance are the ways chain lead firms establish principles and standards for holding their control and governance positions in production-business activities. Therefore, the building of support policies for domestic firms in learning to enhance innovation capacities for participation in stages with higher added values in global value chains should be based on analysis and right identification of types of governance and modes of learning in conformity to types of global value chains.

This paper is focused on analysis of upgrading types in global value chains and demands of innovation capacities, types of governance and impacts to modes of learning of domestic firms. On basis of global analysis of some types of value chains in Vietnam the paper proposes some suggestions for policies to support domestic firms to exploit better the learning capacities for their upgrading in global value chains.

1. Participation in activities/stages with higher added values in global value chains and roles of innovation

1.1. Types of upgrading in global value chains and roles of innovation

Studies by international scholars showed the types of upgrading in value chains *(Kaplinsky & Morris, 2001; Humphrey and Schmitz, 2002).* In the scope of this paper, the attentions are focused on the following types of upgrading:

(1) Upgrading of functions: it is a translation of firms to other stages which require more skills and experiences and produce more added values, e.g. translation from simple operations of fabricating and assembling to full package of fabricating or operations of Original Equipment Manufacturing (OEM), operations of Original Design Manufacturing (ODM) which include designing-manufacturing-supply of related products and services, and operations of Original Brand Manufacturing (OBM) which include production of products with own trademarks;

(2) Upgrading of process: it is a translation of input elements to output products in more effective manner through re-structuring production activities and applying advanced technologies;

(3)Upgrading of products: it is a continuous process of enhancing quality of products or shifting to market segments of products of higher grade and higher selling prices as well as diversification of products.

For upgrading of firms to higher stages with activities of higher added values in value chains the crucial point depends on capacities to exploit learning opportunities and development strategies of domestic firms. Studies by *Gereffi, Frederick and Fernandez-Stark* gave interpretations of upgrading process of garment firms to stages/activities of higher added values in global value chains (Table 1).

Table 1. Types of upgrading of garment firms in global value chains

Types of upgrading	Nature	Features	Requirement of innovation capacities
Full package/OEM/FOB (Upgrading of functions)	Translation from simple fabricating operations to realization of orders of type "purchase of materials and sales of products"	- Instead of simple fabricating operations, suppliers now are required to take more activities such as searching and purchasing of input materials for producing operations. - Suppliers may also carry out distribution of fabricated products.	- Capacities of management of supply chains (search and selection of materials to meet requirements of orders, links with material suppliers, negotiation of prices) - Marketing capacities. - Renovation of technological process (modernization of producing process, production organization, application of compact production types, Kaizen 5S, information technologies).
Design of products (ODM) (Upgrading of functions)	Translation to stage of designing	- Suppliers participate in pre-production stages such as design and development of products, trial production - Design works may need cooperation with client firms who may put their trademarks of sample designs. - In many cases, ODM firms cooperate with designers of lead firms to develop new products.	- Capacities of designing (knowledge about market trends, aesthetic views, knowledge of materials and application of advanced technologies in product designing works) - Capacities of implementation of trial production and completion of final products
	Translation to stage of development of own trademarks	- Suppliers may develop themselves products with their own trademarks, two options being possible: + Holding links with client firms and cooperating to build up trademarks	- Capacities of investment for development of trademarks - Capacities of dissemination of trademarks. - Capacities of designing - Capacities of protecting trademarks

Types of upgrading	Nature	Features	Requirement of innovation capacities
Development of trademark of products (OBM) (Upgrading of functions)		+ Setting up their own channels of distribution through access to domestic markets and countries in the region. This choice offers chances to develop marketing and distributing skills	- Capacities of exploiting trademarks
Upgrading of product	Shifting to products with higher added values	- Production of new products with higher standards, higher added values, improvement of existing products and diversification of products Example: in textile-garment sector, shifting from simple garment fabrication service (shirts, pants) to fashion dresses, or, in rice production sector, shifting to production of varieties of higher quality	- Capacities of investment for innovation of specially dedicated equipment - Capacities of management of quality of product - Capacities of marketing
Upgrading of process	Re-organization of production activities and use of advanced technologies	- Machines-equipment: Investment for upgrading of technological lines for higher productivity - Information and logistics service: application of ICT and advanced technologies favorable for related activities, lower costs, shorter time and higher flexibility	- Capacities of operation of equipment and production lines - Renovation of technological process (production organization, application of compact production types, Kaizen 5S, application of ICT)

Source: Development from studies by Gereffi, Frederick and Fernandez-Stark, 2011.

1.2. Innovation capacities

Depending on the scope of innovation activities, some types of activities are called together as innovation and, in some cases, they are in fact technological renovation. However, in many studies, the term of "technological renovation" is used to emphasize the actual objects to be renovated which are here technologies in a narrow sense, while the term of

"innovation" is used to indicate renovations in a broader sense which include technologies, management, production, investment, linkage, marketing and etc. Therefore, innovation capacities include technological capacities and other related types of capacities. In reality, the level of importance of these capacities depends on types of global value chains and stages firms operate in and strategies of participation firms follow in global value chains. In order to meet needs of management of technological renovation for firms and to build up support policies to enhance innovation capacities, many international studies make efforts to classify innovation capacities into concrete categories *(APCTT-ESCAP, 1999; Tran Ngoc Ca, 1999)*. According to them, the categories of innovation capacities can be summarized as follows:

- *Capacities of investment*: They are capacities to recognize needs of investment and to carry out the following operations such as preparation, set-up and implementation of investment projects, extension/modernization of existing production-business facilities;
- *Capacities of production*: They are capacities to operate stably production lines, to master production organization, to search sources/suppliers of input materials to meet new requirements of production-business activities ;
- *Capacities of technological renovation*: They are capacities proactively to replace partially or fully the technological lines in use by more advanced ones for purpose to enhance competition capacities. Depending on choice of targets, the technological renovation can be divided into two basic types: technological renovation of product (innovation of product) and technological renovation of process (innovation of process);
- *Capacities of marketing*: They are capacities to catch timely needs and change of needs of clients where important elements are marketing intelligence, market trends and skills to set up links with clients.

2. Modes of learning to enhance innovation capacities in environment of global value chains

2.1. Types of governance of value chains

Types of governance are the ways where the chain lead firms realize its rights to manage through coordination of production activities of firms operating in the chain without needs to hold direct ownership rights to them. By other words, the types of governance are the ways where the chain lead firms establish principles and standards to control and to realize governing actions toward production-business activities of firms operating

in the chain *(Kaplinsky, R. and M. Morris, 2001)*. In his studies, Gereffi indicates 5 types of governance of global value chain including: market, modular, relational, hierarchy and captive *(Gereffi, 2005)* which are summarized as follows:

- *Market type:* This type of governance is characterized by independent relations based on market purchase and sale agreements between firms operating in the chain. This type of governance is suitable for not-too-complex transactions with easily and simply standardized information on configuration of commodities. As rules, potential suppliers having full capacities to produce rightly standardized products are totally capable to control production activities (input materials, technological process and etc.) without intervention from client firms;
- *Modular type:* This type of governance is characterized by transactions of more complex products which are designed and manufactured according to modular principles. Here, products are standardized in details and simplified on basis of technical standards. Suppliers who master fully production process and technologies are capable of realizing orders according to configurations required by clients. This type of governance is usually applied in industrial electronic sector;
- *Relational type*: This type of governance is characterized by complex transactions and trust-based close relations (familial relations, geographically close social relations and etc.). This type of governance comes from not-easy-to-be-standardized (tacit) information and knowledge which are then difficult to be shared. Interactions in this type of governance are based on long historical and familial stories and, because of that, it is difficult and time consuming to establish such a relation with new partners. Suppliers in this type of chain are required to have high skills and to be capable of supplying products totally different from the ones of the same categories on markets;
- *Hierarchy type:* This type of governance is characterized by suppliers with limited competences which have to be dependent, dominated and controlled by client firms. Client firms usually need to provide them with necessary information and concrete instructions in order to get from them products to meet requirements. Lead firms, as rules, keep core capacities, particularly in stages of design, R&D and distribution and then have controlling and imposing rights toward small and medium enterprises ;
- *Captive type*: This type of governance is characterized by longitudinally integrated operations. Lead firms keep directly ownership rights in some stages in the chain. The linkage in this type of chains is similar to the

one multinational companies have towards their subsidiary companies in different countries. This type of governance, as rules, is suitable for chains with highly complex products which are not easy to be standardized with well-defined technical specifications. Also, suppliers are usually low in terms of professional competence.

2.2. Modes of learning in value chains

As shown by international experience, the participation of domestic firms in global value chains is found as important channel to get information on assortment and quality of products and technologies the world's markets require and to find access to these markets. However, in order to get benefits from these opportunities, firms are required to learn proactively to enhance their innovation capacities. By this way they can upgrade to stages with higher added values or shift to activities with higher added values even in the same market segment they hold in the value chains. Their own capacities apart, the interactions of domestic firms with lead firms and other partners are important driving forces to push up the learning to enhance their innovation capacities.

Studies by *Pietrobelli and Rabellotti (2009, 2011)* emphasise the fact that, even the participation in global value chains offers rich opportunities of learning for participating firms, practically the level and modes of learning depend on the type of governance of chain lead firms. Accordingly, the modes of learning corresponding to the types of chain governance are summarized in Table 2.

Table 2. Modes of learning in global value chains

Type of governance	Modes of learning in global value chains
Market	- Knowledge spillover - Imitation
Modular	- Receiving information and knowledge on technical, social and environmental standards - Learning through pressure to accomplish quality standards
Relational	- Frequent interactions, direct discussions
Hierarchy	- Supports from lead firms in training and technology transfer (some simple technologies and skills for assembling operations)
Captive	- Imitation - Knowledge spillover - Mobility of human force - Training of domestic human force - Technology transfer (limited).

Source: Pietrobelli and Rabellotti, 2011.

For chains based on market transactions, the main modes of learning include knowledge spillover and imitation and, by this way, domestic firms in developing countries can get knowledge necessary for adjustment and renovation to maintain or upgrade their positions in the chains. This type of governance is observed with small sized clients and then the position upgrading of firms in the chain depends on adequate investments in stages of design, product development and marketing.

For modular type chains, suppliers produce pieces, components or modules according to technical standards defined in details by lead firms. Therefore, lead firms make pressures on suppliers forcing them to renovate and keep pace with technological advances without direct participation in process of learning. Lead firms are important external actors to push up learning and renovation of suppliers through fixation of standards, control of realization works and provision of supports for realization of standards (if needed). Domestic suppliers participating in modular type chains have to make deeply specific investments and to build up and regularly to upgrade specific production capacities for entrance into and position upgrading in global value chains. They have to make great efforts for learning to work and they rarely get proactive supports from lead firms. Consulting organizations and agencies which grant certificates of quality or certificates of standard compliance play important roles in supporting domestic firms.

For relational type chains, due to complexity of information and tacit knowledge, the links in the chains are very close and here direct exchanges and mutual learning are usual practice. Firms in the chains have a high level of synergy. Efforts of learning to maintain positions require long term investments which are difficult to be transferred to other purposes of use. This means to lead them to large losses if they have to shift orientations to new relations.

For hierarchy type chains, lead firms usually have proactive interventions to the process of learning of those suppliers who are not enough competent to be independent (but costs of learning would be low). This support is confined within some simple skills (assembling, simple fabrication, control of quality). Lead firms usually hold core capacities such as design, distribution and marketing. Therefore, low competent suppliers are difficult to escape from dependent positions from lead firms.

For captive type chains, the learning is usually realized through mobility of managers and skilled labors, training of local labors, knowledge spillover and learning-by-imitating. In some particular cases, the technology transfer in made in official ways through contracts but these cases require measures of legal protection and are based on protection of IP rights of lead firms.

2.3. Interactions between innovation systems and modes of learning of firms in global value chains

In their studies, *Pietrobelli and Rabellotti (2009, 2011)* made analysis of modes of learning to enhance innovation capacities for firms in global value chains. Two important aspects in innovation systems which get attention are technological policies and technological organizations. Technological policies relate to importation of technologies, encouragement of R&D and training of skills. Technological organizations include agencies which supply metrology services, standard tests, R&D, training works, consulting services and etc. The authors state that innovation systems in developing countries need to pay attentions to those agencies which are capable of providing services for technological diffusion and promotion such as metrology, standards, testing and quality services (MSTQ), technical consulting and management service, and business development consulting services. Also, activities of receiving and mastering of technologies from advanced countries play important roles to push up the process of learning and renovation in developing countries.

From another side, in order to get benefits from opportunities of participation in global value chains, firms and policy makers in developing countries need to understand three factors which control decisions to select the types of governance by chain lead firms, namely:

- Level of complexity of transactions: it is the level of complexity of transfer of information and knowledge necessary for realization of actual transactions;
- Capacities of standardization of transactions: it is capacities of standardization of information or knowledge for efficient transfer without causing additional expenditures to involved sides;
- Capacities of suppliers operating in value chains: it is capacities of awareness of and compliance with complex requirements of transaction partners.

Analysis was made by authors for specific features of national innovation systems, with different levels of development, have important impacts to three factors controlling the selection of type of chain governance: level of complexity of transactions, capacities of standardization of transactions and capacities of suppliers in chains (Table 3). Studies also show the type of governance of global value chains can vary and adjust during process of development of new systems.

Table 3. Global value chains and interactive relations with innovation systems

Type of governance of chains	**Factors controlling types of governance**	**Innovation systems**	
1. Market	LOW level of complexity of transactions	Lead positions of MSTQ agencies. Lead positions of educational, training and vocational organizations.	Good, complete and smooth structures of systems as pre-conditions for 1-2-3 to occur
	HIGH level of standardization		
	HIGH level of capacities of suppliers		
2. Modular	HIGH level of complexity of transactions	Lead positions of MSTQ agencies Lead positions of educational, training and vocational organizations	
	HIGH level of standardization		
	HIGH level of capacities of suppliers		
3. Relational	HIGH level of complexity of transactions	Lead positions of "local/regional" systems and synergy of knowledge Less important roles of MSTQ agencies Lead positions of educational, training and vocational organizations	
	LOW level of standardization		
	HIGH level of capacities of suppliers		
4. Hierarchy	HIGH level of complexity of transactions		4-5 are usually observed in incoherent and weak systems. Chain lead firms can recover weakness of the systems but the upgrading of domestic firms is limited **Eventual developments:** - Progress in quality control can help easier translations from 4, 5 to 2 - Progress in
	HIGH level of standardization	Less important roles of MSTQ agencies	
	LOW level of capacities of suppliers		
5. Captive	HIGH level of complexity of transactions	Possible benefits of domestic R&D organizations from partners	
	LOW level of standardization		
	LOW level of capacities of suppliers	Global value chains expected to enhance technical skills of labors	

Type of governance of chains	Factors controlling types of governance	Innovation systems	
			local/regional systems usually help translations from 4, 5 to 3 - Translations from 4, 5 to 2, 3 usually led by systems are improved thanks to supports from suppliers

Sources: Pietrobelli and Rabellotti, 2011; Morrison, Pietrobelli and Roberta Rabellotti, 2008

Impacts from different levels of development of innovation systems to chain governance controlling factors are interpreted by authors as follows:

(a) Level of complexity of transactions and innovation systems

A good and efficient innovation system would provide supports to lower the level of complexity of transactions and, thanks to that, the market type of governance in global value chains or non-captive types of governance have chances to get formed.

When investors need to decide between options of "self-making" or "external purchasing", they have to balance between the "external purchasing" accompanied with low production costs and high transaction costs, and the "self-making" accompanied with high production costs and low transaction costs. Under unfully developed mechanisms of market, low power of implementation of contracts and largely expanded practice of corruption the highly rising transaction costs will force firms to take decisions for the self making and then it turns out to be difficult to exploit benefits from specialization between firms.

Relating to science-technology, the unified standards issued by firms and the efficient works by test-quality controlling agencies lead to lower costs of technological transactions and learning and the application of relational type of governance would become easier. Thanks to that, the learning by domestic firms in hierarchy chains can shift to more complex activities with higher added values such as designing and production planning. This process will facilitate the translation of relations within chains to other types of governance more comfortable for technological learning by firms.

(b) Level of standardization of transactions and innovation systems

Relating to simple transactions of market type, the prices reflect fully related information thanks to low level of complexity of transactions. However, relating to complex transactions with high level of standardization, firms in developing countries usually have low competences and skills for realization. Innovation systems with full development of infrastructure for MSTQ controls can help firms participate more efficiently in transactions with high level of standardization. The use of standards from international organizations or chain lead firms becomes increasingly compulsory requirements for participation in global value chains based on high level of standardization.

In context of fast progressing progress of technologies, highly rising level of complexity of products and largely extending level of globalization of production-business activities, the industrial standards are found to have more important roles. Standards help to lower transaction costs and asymmetric situation of information between buyers and sellers, reduce uncertainties and hazards in terms of quality and technical specification requirements. Standards give important contributions to propagation of standards within sectors as well as between sectors. In developed countries, standard agencies can propagate practice of standards through various measures of stimulation to help firms in understanding and applying new and necessary standards. This also helps to lower the level of complexity in technological cooperation between firms and facilitate higher capacities of suppliers in developing countries for next participation in global value chains.

In principle, the market and modular types of governance are selected when domestic suppliers have good capacities and knowledge and apply technical standards and norms in their activities.

(c) Capacities of suppliers and innovation systems

Capacities of domestic suppliers are basic conditions for their participation in global value chains and, at the same time, important factors for determination of type of governance by chain lead firms when they participate in.

Innovation systems including various institutions and organizations, particularly in relation to science-technology and training, play important roles to enhance innovation capacities for domestic firms in global value chains. The innovation systems have to be capable identify the types of governance domestic firms need in actual stages of their development and then to provide most suitable offers.

As shown by international experience, when capacities of suppliers get enhanced the chain lead firms may vary types of governance in global value chains in more suitable manner, such as translations from hierarchy and captive types of governance to market and modular types of governance.

Innovation systems can also be oriented to meet needs to enhance capacities of firms depending on opportunities and strategies they are following. If a firm wants to develop through mastering production technologies and, by this way, to consolidate its existing position in global value chains, the innovation systems have to orient to the types of skills, knowledge and technologies capable of assisting the firm to achieve their goals. In case that, a firm wants to follow a strategy to enter to activities with higher added values in global value chains the innovation systems have to help the firm to learn and to master design and R&D capacities.

3. Some suggestions for Vietnam in terms of support policies for domestic firms to participate in stages/activities with higher added values in global value chains through innovations

The building of support policies for domestic firms to learn and to upgrade innovation capacities for participation in stages with higher added values in global value chains needs to be based on analysis and right identification of types of governance and modes of learning suitable for the types of governance that domestic firms look for participation in or upgrading to stages with higher added values.

As illustrations, in global value chains in textile-garment sector (and also in sector of electronic consumer commodities), majority of Vietnam domestic firms remain in stages of fabrication of products in medium segments of values (jackets, shirts, pants) with not-too-complex transactions, easily and simply standardized information on configuration of products, full capacities of manufacturers to meet required specifications, total control of producing activities and no interventions from clients. Clients (fashion firms, trading companies and retail sellers) apply the market type of governance for transactions in this sector. The modes of learning are mainly based on spillover effects and imitation of knowledge and skills, measures of attraction of experienced staffs from other successful firms in the sector and interactions with overseas experts.

Therefore, State policies need to pay attentions to support measures to facilitate diffusion of information, dissemination of experience of standard practice of technological solutions and management of supply chains between firms in the sector. Namely, supports for regular organization of communication activities, set-up and operation of information hubs for

innovation learning, formation and development of networks of technological promotion services.

In global value chains of electronic and IT products, the participation of domestic firms remains very limited, both in terms of scale and level. Real involvement of Vietnam firms shows only a few firms can fabricate technologically complex products such as LED monitors, electronic boards or some packages in value chains of LG and Samsung corporations[2]. As rules, these products have high technological contents, are designed on modular principles and are simplified and standardized in details through technical specifications. Suppliers carry out orders according to client required configurations and totally master production processes. In these chains, the modes of learning mainly are based on pressure from lead firms which require them to learn for enhancement of innovation capacities for fabricating operations according to determined standards and requirements. State support policies need to be focused on solutions to enhance capacities and efficiency of activities of technical service organizations, particularly in granting certificates of quality or certificates of standard compliance which would help domestic firms to meet requirements from their clients.

In many cases, Vietnam domestic firms get opportunities from clients to upgrade products and processes but not functions. In fact, the upgrading of products and process brings benefits to the two sides: clients and suppliers while the upgrading of functions would lead to gradual losses of core capacities of chain lead firms. The upgrading of functions depends on capacities of adequate investments, activities of designing, product development and marketing. Therefore, the sectorial innovation systems, particularly for case of universities, S&T organizations and MSTD agencies, would play dominating roles.

Relating to global value chains with hierarchy type of governance where participate suppliers with limited competences and then are found to be dependent, dominated and controlled by large clients, as it is observed in sectors of agriculture, textile-garment and food processing, the modes of learning mainly depend on transfer of technologies and innovations by lead firms as supports for activities with low added values such as assembling,

[2] Among domestic firms doing fabrication service for foreign companies, 4P Co. Ltd. is the only one firm capable of fabricate electronic boards (and LED monitors), products with high added values, for Vietnam LG corporation. In comparison to domestic suppliers, 4P Co. Ltd. have particular advantages for development of strategic supplier-client relations. This feature and properties of fabrication products (electronic boards and LED monitors) make participation of 4P Co. Ltd. governed by modular type in the global value chain of LG Electronics Corporation. Besides, the modular type of governance starts being applied by Vietnam Samsung for fabrication services of some electronic home appliances such as fabrication of vacuumers by Minh Nguyen Supporting Industry JSC.

simple fabrication and quality control. State support policies then, from one side, are to have measures to facilitate lead firms, hub firms and FDI firms to offer solutions to support domestic suppliers and, from another side, are to push up development of innovation systems to support domestic firms in building independent capacities, lowering dependence on lead firms and enhancing capacities of standards-metrology-quality service agencies (granting certificates of quality, certificates of standard compliance).

Regarding global value chains with relational type of governance (information and knowledge are not easy to be standardized, good capacities of suppliers to make differences to their fabricated products made for individually required orders), the modes of learning mainly are based on regular interactions between suppliers and lead firms. State support policies need to focus on facilitating development of regular interactive relations between domestic suppliers and lead firms, hub firms and FDI firms, developing local/regional innovation systems and models of sectorial clusters, supporting to enhance capacities of education and training organizations.

In domestic value chains of rice market, the free market mechanism remains the most popular choice of lead firms for transactions in value chains of local rice market in Mekong Delta area in South Vietnam and Red River Delta are in North Vietnam. Reasons of that include the low level of information and knowledge required for transactions (price, varieties and volume of rice transactions), high possibilities of codification of information and knowledge (price, varieties and volume of rice transactions) and capacities of involved sides (farmers, traders, processing facilities, dealers/shops/supermarket networks, whole and retail sales) capable to meet fully requirements of transactions. The modes of learning in these value chains are characterized by knowledge spillover effects and imitations. State support policies are to enhance supports for models of shows to promote knowledge spillover where farmers and firms can learn each other and share experiences of standard practice.

Contractual relations are now developing in rice value chains, particularly in coordination between firms and farmers[3]. For chains governed by contractual mechanisms or longitudinal integration, the innovation systems are to cooperate with lead firms for training and enhancement of capacities

[3] Contractual mechanisms in domestic value chains in rice sector are similar to modular type of governance in global value chains in indistrial sectors. One of the typical examples of contractual mechanisms is the one practiced in rice value chains of Loc Troi Group, Vo Thi Thu Ha Co. Ltd. and Dong Thap Food Company. The contractual mechanism substitutes the free market one because this mechanism requires more complex information such as origin of rice, residuals of chemicals, level of ripeness and etc. but not simply price and volume as it used to be.

for farmers. Besides, in order to support the function upgrading, the innovation systems are to play important roles in creating knowledge spillover and imitation in the chains through introduction and transfer of core technologies for small and medium enterprises operating in the chain./.

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