IMPORTANCE OF VALUE ADDITION IN HORTICULTURE

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ABSTRACT

Nepal got possibilities of producing a range of horticultural commodities and, therefore, value addition and marketing of such commodities. However, value added horticultural products contribute major share of Nepalese agricultural commodity import market. The present scenario of horticultural commodity market is assessed and policy as well as technical recommendation to strengthen value added market has been proposed in this paper.

INTRODUCTION

Horticultural crops are the major sector of Nepalese agriculture and a wide variety of fruits and vegetables has been produced in Nepal with total annual production estimated at 965044 metric tons of fruits and 3421035 metric tons of tons of vegetables in 2013/14 (MoAD 2014). The horticulture sector has a fundamental role in farm revenue improvement, poverty mitigation, food security, and sustainable agriculture. This sector, however, suffers greatly from postharvest losses. Some estimates suggest that about 30–40% of fruit and vegetables are lost or dumped after leaving the farm gate. Huge postharvest losses result in diminished returns for producers. International markets discard fruits and vegetables containing illegal pesticides, with pesticide residues beyond permissible limits, and with inadequate labeling and packaging (FAO, 2006).

Value addition of horticulture produce is not recent act. It has been started by human being since ancient- time. The first idea of value addition was preserving food for lean period. Value addition is a process of increasing the economic value and consumer appeal of a commodity. It is a production/ marketing strategy driven by customer needs and preferences. Produce is changed from its original form to a more desirable form e.g. apple pie, jams, jellies and pickles etc. There is

an abundant supply of produce in season, if the excess is not conserved it will decay and go to waste. Usually when supply outweighs demand and product fetches less money. The simplest form of value addition is undoubtedly drying vegetable. For e.g. making sandana and chana (dried radish slices). Anaerobic fermentation and drying of vegetable parts (gundruk or mountain soup) is another twist in value addition and marketing of such produce got increasing scope within Nepal and abroad. The value added product development in Nepal initiated with production of bottled pickle from different small cottage industries but there is lack of statistics on the volume of production and sale from such industries. The market oriented production value added products was started with establishment of Rijal Tashi Processing Industry in Itahari in 1981 (http://www.rijaltashi.com.np/). This industry is producing jam, sauce, squash, juice, vinegar, canned fruits and pickles from various fruit crops.

IMPORT AND EXPORT STATUS

Nepal's agricultural import and export trade comprises about 15.6% of total trade. Agricultural trade is dominated by export of lentils, tea, cardamom, fruit, ginger, and medicinal and aromatic plant products (MAPs), with import of fruit, cereals, vegetables, beans (mostly peas), dairy products, meat animal, and raw materials for processing (oilseeds) and manufacturing (fibers for carpets, garments and textiles). There is good potential for import replacement in vegetables, fruit, beverages, dairy and meat(ADS Report 2015). The import and export figure of value added horticultural product of Nepal shows steady increase in both export and import (Table 1). The import is always higher than export of commodities. The dried fruit and nut is the mostly imported product while processed tea, coffee and spices got highest share in export of such commodities in year 2014 (Fig 1).

Table 1. Import and export of value added horticulture product.

Year	Export (NRS in millions)	Import (NRS in millions)
2009	3348.9	7500.8
2011	5485.7	6338.1
2012	6177.1	7264.0
2013	11286.8	8396.7
2014	15605.8	86872.1

(Source: Statistical year books from MOAD, www.moad.gov.np/publication)

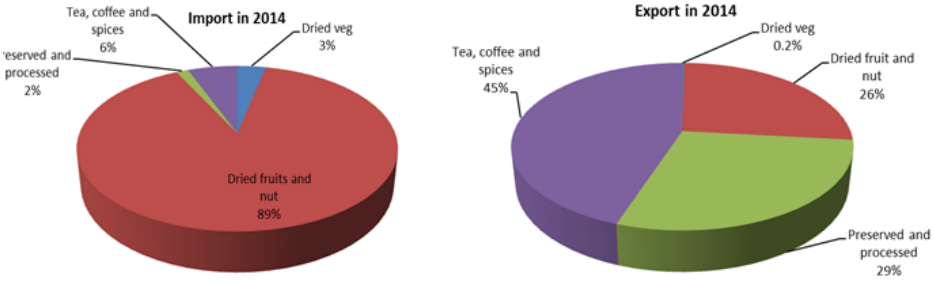

Fig 1. Import and export of value added horticultural products (Source: MoAD statistical year book 2014)

SCOPE AND LIMITATION OF PRODUCTS

In view of limited access to transportation network in the hilly areas, the movement of horticultural produces like perishable fruits and vegetables is still a challenging task. Nepal possesses a great diversity of natural environment where a variety of fruits and vegetables such as apple, peach, plum, banana, mango, and walnuts can be produced. This situation makes the abundant supply of seasonal gluts of horticultural produces in the country and some quantities get wasted due to unavailability of proper postharvest handling and value added processing.

The processing technology of horticultural products range from primary and modest scale used in cottage industries to the modern enterprises that manufacture tetra pack fruit products. There are several fruit and vegetable processing industries of cottage and small scale

which manufacture jams, jellies, squash, candies, fruit juices, dried fruit/ vegetable products etc. most of the processing equipment like bottle sealers, pulpers, juice extractor, are imported from India and China Besides some modern equipment such as Tetra pack is from Sweden. While some modern fruit processing industries import mango and citrus pulps and juice concentrates from India, our horticultural produces from hills do not get access to the processing industries due to lack of transportation and other intermediary preservation facilities in the strategic fruit producing belts.

ACTORS OF VALUE ADDITION MARKETS

There are five key actors involved in value product generation to marketing. In technology generation side local/indigenous knowledge of value addition has key role. Many of value added products are based on indigenous knowledge. For e.g. pickles, confectioneries and sour patches from Nepalese hog plum, dried vegetable products (Sinki, gundruk, masyaura, chana etc). Further to this public research organization (Nepal Agricultural Research Council) and universities (AFU and TU) are also involved in technology generation. A few of non-governmental organizations (e. g.Li-Bird) are also involved in technology generation. NARC is involved in fabrication of machine useful for production of value added product (fig 1-4). Further, it is also involved in method development of some new or quality horticulture products (fig 5-8).

The actors involved in technology dissemination is mainly Department of Agriculture (DOA) which has network in all 75 districts of this country. Beside this public organization, a few projects are in operation in few hills and mid hill districts such as HIMALI and HVAP. These projects are time bound (5-6 year), funded by ADB and IFAD; and lead by government official deputed from Ministry of Agriculture Development. There are other programs also working in promotion of value addition of agriculture commodities including horticulture commodities. One village one product (OVOP) and one district one product (ODOP) are two highly successful program running in Nepal implemented by Agro enterprise center (AEC) under Federation of Nepalese Chamber of Commerce and Industry (FNCCI). These

programs are good example of public private partnership which has benefited small farmers producing unique Nepalese product. OVOP was initiated in 2006/07 with inclusion of Nepalese hog plum (Lapsi), sweet orange (Junar) and wood apple (bel) along with other non-horticultural products. The OVOP program involves 17 horticulture commodities in 19 districts at present. From year 2010/11 ODOP have been lunched in four districts to promote horticultural processing industries (http://goo.gl/9nLnCv). For e.g. tomato ketchup (Dhading), Junar juice (Ramechhap), Arecanut processing (Jhapa) and ginger processing (Synjha) programs. Beside these, ginger trade competitiveness program is also running in Surkhet district under the umbrella of MOAD, FAO and FNCCI-AEC (http://eifnepal.gov.np/page/29/20).Additionally, value addition of citrus fruit crops in Doti district coordinated by LiBird Nepal (http://goo.gl/2ySGZo) is another example of NGO working in raising livelihood of rural poor with foundation of processing especial pickle manufacturing plant.

There are a number of international non-governmental organizations (UNDP, FAO, SNV) funded programs are in operations (MEDEP, SIMI etc). There programs are working in value chain and sub sector analysis which help government and non-governmental institution on formulation of policies and program appropriate for promotion of horticulture product diversification. For example ginger sub sector analysis (http://eifnepal.gov.np/page/29/20).

A number of small cottage horticulture commodities processing industries are operating in different parts of Nepal. Department of Small and Cottage Industries and Small and Cottage Industry Development Board are playing key role for the establishment and promotion of agro based processing industries in different parts of Nepal. The total figure of such industries are difficult to predict as many of these are operating without registration in informal ways. The Rijal Tashi Company is the first to work with market oriented well established value Addition Company in Nepal (http://www.rijaltashi.com.np/). Dabur Nepal a franchise of Dabur India (http://www.dabur.com/nepal) and Dibya pharmacy of Patangali Ayurved Limited (http://goo.gl/OhWS8z) are other value added product production and marketing giant operating in Nepal. Being

impressed with works of such companies and realizing scope of market a number of other processing companies are establishing, however, their economy of scale is very negligible as compared to the big three companies.

TECHNOLOGY AVAILABLE IN NEPAL

There are a number of value added products and their recipes available which are passed from generation to generation. For example, lapsi mada, mango dried pickles (titaura), amala and lapsi dried products, gundruk, sinki, tama (pickled bamboo shoots) etc. These products are suited on Nepalese palate and yet we have to explore their commercial values to international market. Further, due to migration of Nepalese to a number of foreign countries obviously there is niche market of these products in Nepalese occupied parts of the world.

Due to unavailability of small to medium size processing machine Nepalese coffee producers were compelled to sale unfinished coffee bean into international market at low price. Agricultural Engineering Division of NARC has developed two types of medium capacity coffee pulper (manual and electricity operated; 140 kg/ha; Fig. 2 and 3)) (AED, 2011). Similarly, ginger washing machine (Fig. 4) and skin peeler prototypes are in testing phase which could help in producing high quality dried ginger (shutho) in near future (AED, 2014).

Most of Nepalese dried horticulture products are sun dried in open and hygiene of the product is an issue. There are a number of cabinet solar driers available in market which are bulky in nature and cost is very high. Therefore, transporting them to hilly part of countries where possibilities of value added product production in small to medium scale is not feasible. Realizing this constraints NARC has developed low cost plastic solar drier made of UV stabilized tarpaulin sheet and wood which is useful for drying apple slices, lapsi mada and vegetable dried products (AED 2011). This technology is suitable for small scale production. For medium sale processing industries a prototype of walk- in- solar drier is in testing phase (Fig 5). It is made up of UV stabilized plastic sheet and locally available bamboo pole (AED, 2014). This structure is of 2.5 X 5 m in dimension and up to 200 kg of product could be dried at

Fig 2. Hand operated coffee pulper

Fig 3. Machine operated coffee pulper

Fig 4. Ginger washing machine electric operated

Fig 5.Solar tunnel drier

(Source: Agricultural Engineering Division, Nepal Agricultural Research Council, Kathmandu, Nepal)

Fig 6: wine from pear

Fig 7: Kiwi products (juice, wine and dried slices)

Fig 8. Apple Juice from Kalikot

Fig 9. Chip making cultivar (Khumal UJjawal)

(Source: HVAP Department of Agriculture; and FTD and NPRP, Nepal Agricultural Research Council, Kathmandu Nepal)

once. It is suitable to dry mushroom, apple slices, spices, coffee beans, cardamom and vegetable dried products. It is reported that 12 -15 kg fresh apple is required to prepare 1 Kg dried apple slice. A part from these better processing machine, a recipes for value added products have been developed by Food Technology Division of NARC (FTD, 2014). For example, banana nectar, potato chips, Kiwi fruit jam and dried slices, and liquor from a number of fruits (kiwi, plum, pear; Fig. 6-9) etc.

Nepalese food habit is changing with migration of Nepalese people to different part of world as well as easy availability of international food due to opening of supermarkets (e.g. Bhatbhateni). For example, pasta, pizza, juice and salads are entering into Nepalese kitchen. Because of this change in food habit import of processed horticulture products (sauces, juice, chips, French fries, canned vegetable in brine) are increasing over years (Table 1). Only looking at the trend of potato chips import (Fig 10) the suitable variety identification (Fig. 9) (NPRP, 2014) and successful operation of chip producing industry in Nepal could reduce outflow of huge sum of Nepalese currency into the international market.

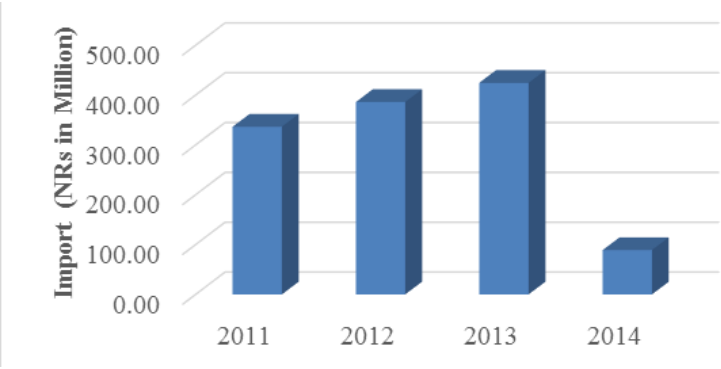

Fig 10.Import of potato chips in Nepalese market over four years (source: MoAD statistical year book)

Success story

There are a few value added successful entrepreneurs in Nepal which are also farmers. A name to cite is Bananna Agro Resort, Kailai operated

by Kalu Hamal (http://goo.gl/F1zPrn). Kalu Hamal received award for successful farmer of the year 2015 from the President of Nepal. The Banana resort produces nearly 21 processed banana products (finger chips, pickles, pudding, dumplings, pancakes, salad, juice, wine etc.) all made out of banana. While relaxing under banana thatched hut in the resort you could test these delicacies and you could bask under hot sun of Kailali bearing banana hat while touring around banana resort.

POLICY MEASURE TO PROMOTE VALUE ADDITION OF HORTICULTURAL PRODUCES

The policy measures needed to develop value added products of horticultural origin are as follows; the preservation and processing technology of horticultural produces require establishment of storage facilities for perishable fruits at an elevation range between 5000 to 8000 ft above the sea level to elongate the shelf life of apple, and citrus fruits for at least six months in natural cellar storage without any deterioration in quality and safety. The storage facilities are to accommodate the glut production in the season. Later on this facilitates production of value added products by minimizing postharvest losses and wastages.

- Encourage establishment of preservation of pulp at the production site and transport to the processing industries. the volume and the quantity of the pulp will be decreased thus making easier for transportation
- Provide technical knowhow on enzyme production technology from horticultural substrates by means of biotechnology.
- Develop diversified value added products from horticultural resources and the research funds for such activities should be allocated through competitive grant system to the potential research organizations
- Implement food quality and safety at all levels of processing to comply with international criteria for promoting agro food trade and consumers safety assurance
- Develop indigenous food preservation and processing technology for generating employment and income in the rural areas

RESEARCH AND DEVELOPMENT

- Development of appropriate technology for fruit preservation and processing at different scale of operation suitable to various locations
- Utilization of by-products for production of ingredients like pectin, citric acid, peel oil, vinegar etc.
- Production of high quality products for export promotion and import substitution
- Development of novel fruit products such as probiotic fruit juice and drinks, and various other fruit products admixing with the extracts of medicinal plants having varied therapeutic drinks
- Development and standardization of wine technology for utilizing various horticultural produces for producing white wine, red wine and cider etc.
- Industrialization of pickling industries such as Gundruk , Sinki and Tama for developing value added products by pure culture fermentation process
- Product optimization and Standardization of vegetable pickles for export potential
- Development of process for manufacturing crude enzymes which are essential for juice processing
- Development of appropriate packaging technology for valued added horticultural products
- Dissemination of package services value added processing to the potential entrepreneurs at rural areas through related government bodies and private consulting services.
- Collaborate and identify niche areas of value addition, formulate programs and set up technical working groups. Low cost equipment/ machinery to be developed especially for small farmers.

WAY FORWARD

Nepalese youth forces are heading towards Middle East countries in huge number each year in search of job. With better policy and program to promote in-country horticultural processing industry we could not only substitute the importation but also absorb the youth force in our

own countries. Policy on easy credit access to agro-based industries by government of Nepal and directives to Nepalese Banks is another approach. Youth self-employment program is one program which could be better utilized to boost value added industries. Further, there are a number of projects and programs (PACT, HIMALI, NARDF) providing fund for agricultural R and D. These program could positively discriminate horticultural based processing industries while screening proposal for grant program. Recently GoN has ratified Agricultural Development Strategies (ADS) for 20 years (www.moad.gov.np), where one of the component is marketing of agricultural commodities for import substitution. Program on enhancing horticultural based processing industries from ADS is anticipated to harness the potentiality of this sector. Finally, we have our unique Nepalese products and small to medium scale of operation. Therefore, it is always not suitable to introduce and use bigger processing plants from abroad. We need more research work on prototype development and fabrication of machineries based on our scale of production and type of commodities we are manufacturing. Further, while marketing value added product the best manufacturing protocol of the products and branding are essential and research from R and D partners on these aspect and dissemination of the best practice though training and mass media to entrepreneurs are needed.

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