

Research Article



Value Chain Development and Social Upgrading at Upstream of Mango Value in Pakistan

Mubashir Mehdi^{1*}, Muhammad Bilal Ahsan¹, Burhan Ahmad¹, Khuram Nawaz Sadozai², Gulnaaz Hameed³ and Muhammad Asif⁴

¹Institute of Business Management Sciences, University of Agriculture, Faisalabad, Pakistan; ²Agricultural and Applied Economics, the University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; ³Pir Mehr Ali Shah Arid Agricultural University, Rawalpindi, Pakistan; ⁴P and D Pakistan Agricultural Research Council, Islamabad, Pakistan.

Abstract | Horticulture value chains particularly mango got high prominence in the agriculture production system of Pakistan. Market incentives, vertical relationship management and increasing pressure for certified and standardized products has pushed mango farms in Pakistan to acquire certifications like Global GAP. Workers' working conditions and their basic rights can influence on sustainability of mango value chain system in Pakistan particularly under the guidelines of LO decent work agenda. Double-log regression model is used to assess the effects of decent work agenda and its effect on social upgrading of workers both at Global GAP certified and traditional non certified orchards in Southern Punjab and Sindh. Since the certified orchards are driven by the global value chain system under the food safety and quality standards, they have more potential and prospective to improve the livelihood of the on-farm workers. Education included as schooling years was found major regressor for the income of on-farm laborers. In ceteris paribus conditions, coefficient of education indicates that there is a positive relationship among education of labor and Income. Credit facility at farm level was also incorporated as dummy variable under economic context of decent work to assess its regressing level with income and was reported as significant. The study concludes that social upgrading of workers has implications and potential for economic upgrading of value chain system in terms of premium quality products, decent employment conditions and improved income.

Received | May 10, 2019; **Accepted** | March 25, 2020; **Published** | April 28, 2020

***Correspondence** | Mubashir Mehdi, Institute of Business Management Sciences, University of Agriculture, Faisalabad, Pakistan; **Email:** ksaddozai@aup.edu.pk

Citation | Mehdi, M., M.B. Ahsan, B. Ahmad, K.N. Sadozai, G. Hameed and M. Asif. 2020. Value chain development and social upgrading at upstream of mango value in Pakistan. *Sarhad Journal of Agriculture*, 36(2): 574-585.

DOI | <http://dx.doi.org/10.17582/journal.sja/2020/36.2.574.585>

Keywords | Global value chains, Decent work, Sustainable livelihood, Pakistan mango industry, Double log regression

Introduction

Pakistan is an agriculture based country, have a population of 180 million, two-thirds of whom live in rural areas. It contributes 20.9% of total gross domestic product and 30% to gross national product (GoP, 2015). Agriculture is considered as the engine for industry growth and scarceness reduction and, therefore, is given high priority in government policies and growth strategies in Pakistan (GoP, 2016). Nearly,

43.5% of the total workforce are directly involved in agriculture wherein half is women (Ghani, 2012). Rural areas have more than double share in total employment. However, majority of them are socially deprived and economically stressed in terms of low wage.

Agricultural industries in Pakistan such as horticultural industry have gained adequate attention both from the Government as well as the international

development agencies such as United States Agency for International Development (USAID), United Nations Industrial Development Organization (UNIDO), and Australian Centre for International Agricultural Research (ACIAR) etc. value chain approach has been adopted to improve the competitiveness of the farmer enterprises in this sector. During the past two decades, a political opinion has developed a new food legislation which comprises the whole of value chain approach “farm to fork” from the pre-harvest areas of food production leading to the processing and marketing which has changed the agribusiness development in rural industry development contexts. Other than Quality, Consumers in developed countries are getting more conscious about conditions in which product is produced, processed, packed and transported as well as employment conditions of Labor (FAO, 2015; Hurst et al., 2005). For example, Global GAP, an international standard lead by top leading supermarket chains, set out comprehensive compliance criteria for farmers to become the part of competitive global value chain system. Consequently, certified farms in developing countries prefer to export instead of supplying to domestic markets and earning substantial gain in the overall price of their produce (Raynolds et al., 2004; Dunne and Collins, 2014). However, there is little evidence exists about of on-farm labor issues particularly into international value chain system in developing countries despite the fact it is highly emphasized under the quality assurance system such as Global GAP.

The agenda of decent work of ILO involves the “fair income, security in the workplace and social protection for families, better scenarios for personal development and social integration, the liberty to show concern, participate and organize in the decisions that affect their lives and equality for all women and men” (ILO, 2015). Global GAP have also developed standards for on-farm labor rights which are inspected by consultants after systematic intervals. It covers risk assessment for health and safety which includes trainings for occupational health and safety, hygiene management to keep labor apart from diseases, prevention from skin cuts by protective clothing which is common during on-farm practices, First aid boxes, warning signs etc. and other social and economic consents for labor welfare (Global GAP, 2016).

Low quality is one of the major problems being

faced in horticultural exports due to their perishable nature and other issues. By minimizing pre and post-harvest losses, best quality fruits can be acquired by most efficient and productive labor which can only be conceivable by ensuing the decent work approach under ILO sustainable development agenda for their best satisfaction by making them a part of Global Value Chains. Hence, workers developments got prominence importance among the development agencies as well as global certification systems (ICDD, 2014; ILO, 2012; Global GAP, 2016) in order to ensure healthy and nutritious food to the end consumers.

Mango industry of Pakistan

Mango (*Mangifera Indica*) also called locally “king of fruits” is inherent to eastern India and Burma. After Citrus, Mango is the second major fruit crop in Pakistan. Pakistan is the 5th best producer of mangoes after Indonesia, Thailand, China and India (FAO, 2015). Many varieties are produced in Pakistan, which are Anwar Ratol, Dodheri, Langra, Malda, Siroli, Alphonso, Gulab Khas, Fajri, Golden, Began Phali and Swarnarika characterized by shape, size, acidity, aroma, taste and colour. While two varieties, Chaunsa and Sindhri, are high commercial value both in the domestic as well as in the international markets.

Mango is being grown majorly in two provinces of Pakistan; Punjab and Sindh, while the other provinces are also cultivating mangoes in lesser quantities; Baluchistan and Khyber Pakhtun Khawah. During the year 2010-11, contribution of Punjab province to total mango production was 79.71 percent, while Sindh contributed up to 20.22 percent (GoP, 2012). The harvesting season for mangoes varies according to the climatic conditions of different regions. Sindh's harvesting starts early to some level.

Pakistan is one the leading world exporting countries of mangoes. Pakistan was ranked 8th after The Mexico, Brazil, Peru, India, Peru, Philippines and Thailand. Pakistan has many export markets but mainly export to the United Arab Emirates, Saudi Arabia, Qatar, The United Kingdom, Afghanistan, Iran and Oman (Ghafoor et al., 2009; GoP, 2009). A lot of initiatives have been taken by Government of Pakistan and other International donor agencies to empower of Pakistani mango growers and exporters to meet the protocols of premium quality super retail stores in domestic and international markets especially USA

and Europe. Nevertheless, there are many deterrents in terms of Global certification systems (HACCP and Global GAP), pest's issues, worse employment conditions and lack of management consultancy services to farmers as well as workers.

Based on the mango quality produced in Pakistan, mango orchards can be classified into two broad categories such as certified and non-certified orchards. Mango from Non-certified orchards are specified by typical quality standards of size, aroma and appearance that are mainly sold out in the local markets. These traditional mangoes are infected by harmful chemicals and other pesticides which are used to improve production and protection from pests.

On the other hand, some certified orchards are creating a place in international markets as well as in premium quality outlets and super markets in big cities e.g. Karachi, Islamabad, Lahore and Faisalabad due to extra features e.g. Prestige, blemish free, ethylene ripening, cardboard packaging etc. (Mehdi et al., 2014; ACIAR, 2007). These orchards take proper care of fruit under the compliance of Global GAP certification systems. These type of compliance not only convert fruits into organic consent but also decrease the post-harvest losses by improving fruit quality. These certified orchards are seen acquiring more benefits cost ratios for premium quality mangoes than the non-certified orchards (Mehdi et al., 2014). Producers are the most common victims of supply and demand fluctuations in traditional value chain system. Due to market incentives and increasing pressure for standardized and certified products, most of mango farms in Pakistan are getting certifications such as Global GAP (Good Agricultural Practices) certification system to become the part of global value chain system. Nearly, twenty mango farms have acquired Global GAP certification (PHDEC, 2016).

Decent work deficits of on-farm agricultural workers

The term Waged agricultural workers described as; women or men who work in the fields, orchards, greenhouses, livestock units, and pack houses or primary processing facilities. They are termed as waged workers because they have no piece of land owned or rental where they can work nor the implements and instruments they own and they are different from farmers (Hurst et al., 2005).

These workers can be diversified into three main

categories: 1) permanent workers; they have job security to some level as full time employment. 2) Seasonal workers; they work only in season for a specific time period and use other livelihood strategies such as infrastructure development, construction and other occupations during the off-season. 3) Migrant workers; who work for a specialized skills and move from one place to other frequently (Ghani, 2012). We can further categorize them as highly skilled and low skilled workers. High skilled workers are involved in technical practices like harvesting, de-sapping, machine operating, packing, and sorting at orchards and pack houses. Low skilled workers are involved in ordinary work like loading, cleaning and helping in technical practices.

However, on-farm workers have been treating with wages and considered deprived class of the rural area in Pakistan. 45 % of total occupational injuries are directly related to on-farm workers. As such, no direct labor law exists to protect their right, but some provisions in Provincial Employees Social Security Ordinance, 1965 for just agricultural establishments which are less in number. They are receiving in-kind payments like wheat, rice or other agricultural crops instead of real wage rate against their services (Ghani, 2012). They are powerless to unite themselves. So, they are termed as a discrete class because of complete dependency on farm owners/landlords.

Preliminary evidence exists that on-farm agricultural workers have contributed to sustainable development of agricultural sector (Hurst et al., 2005). Children and teenagers are working on fruit farms in poor health conditions. When adults try to organize to make union as these are their basic rights according to the International Labor Organization they always face harsh reactions by farm authorities (Pier and Zamvil, 2002). Whereas, some global GAP certified orchards are transforming wage rates and other working conditions following the sanctions in international certification protocols. The present case study was designed by assuming a hypothesis that through transformation of rural value chain system socially under food safety and quality standards, there is enough potential for economic upgrading. Interdependency among Decent work Indicators and Livelihoods are assessed at the bottom of the value chains.

Conceptual framework

Numerous case studies can be found highlighting about problems of lack of access and deprived working conditions to decent work (Smith et al., 2004; Hale and Wills, 2005; Oxfam, 2004; Collins, 2003). Both international compliances and institutional support contributes to socio-economic development of the value chain actors. Global Value chains whether these are driven by consumers or producers tend to adopt certification protocols and therefore, contributes greatly to functional upgrading of workers due to consumer's concerns about production point and brand visibility especially in consumers' driven value chains.

In case of fresh fruits and food commodities, quality and safety measures are of extreme concern for supermarkets in developed countries and also for their consumers (Humphrey and Memedovic, 2006). On-farm safety and quality standards as well as Social rights of labor are respected by Global value chains too because of their brand reputation and products quality that ultimately headed to premium quality products by improving economic value. International compliances enforce many restrictions for certified farms in developing countries to follow decent work approach which ultimately lead to upgraded Mango value chain system which has implications for sustainable livelihoods improvements of on-farm workers. The conceptual framework is illustrated at Figure 1 is derived from the global value chain approach and international labour organization ILO development agenda of the decent work at farm level. The conceptual framework delineate the international compliance and occupational health safety along with economic gain of GVC that can upgrade wellbeing of farm workers. However, institutional support particular on Farm Labour Laws are vital to achieve sustainable value chain in the developing countries.

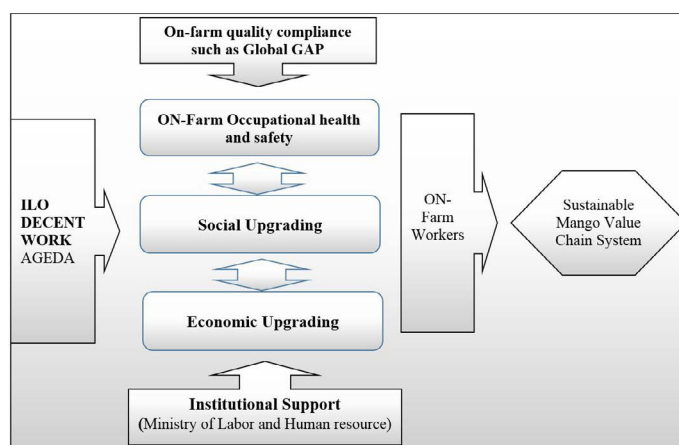


Figure 1: Conceptual framework.

Preliminary evidence exists that Social up gradation like unionization have contributed significantly to the economic up gradation as well as to Occupational health and safety standards capturing accomplishments for workers (Freeman, 1981, 1982; Hirsch, 1997).

Objectives of study

This study is designed to understand the decent work deficits and how adoption is affecting the income of on-farm workers in mango value chain system of Pakistan.

1. To analyze the socio demographic factors of the workforce on the certified and traditional orchards that effect on decent work agenda.
2. To analyses the interdependency of decent work indicators on the livelihood of the on-farm workers
3. To identify the appropriate actions and strategies to improve decent work on mango farms.

Materials and Methods

Case study methodology was adopted to seek an in-depth understanding of improved value chain's effects on the livelihoods of on-farm workers with reference to both certified and non-certified orchards. Three major mango growing regions are selected from two provinces: Punjab and Sindh of Pakistan as a target area for data collection. These two province produce 95% of the total mango production.

Fifteen certified orchards were identified by simple random sampling technique from both provinces. A total of 200 workers from Global G.A.P certified and non-certified orchards were surveyed purposively. In depth interviews were conducted with the farm owners and the labor contractors on each farm.

Analytical methods

- A comparative analysis of certified and non-certified orchards was done using descriptive statistics like Frequencies, percentages and Means.
- Double-log regression analysis is performed to assess the interdependency among social and economic upgrading of on farm workers in terms of decent work practices being performed at farm level.

The main objective set out for this case study was to assess the interdependency between livelihood of workers and decent work variables mainly focused on the income of on farm workers. Double-log regression model was employed because socio-economic

variables showed a positive relationship with income and different decent work indicators taken in this model as dummy variables are also included to capture their effect on income. All the regions have equal contributions in the model in terms of participation rate. According to economic literature, double log regression models should be preferred when economists deal with growth related approaches and variables (Gujarati, 1995).

Decent work and livelihoods regression model

An empirical model can be represented as:

$$I_L = f(C, S_D, P_D, E_D) \dots\dots (1)$$

C= Socio-economic attributes taken as continuous variables; S_D = Dummy variables in Social context of Decent Work; P_D = Physical and Human factors of Decent Work Indicators; E_D = Economic variables are symbolized as dummies.

As such, above given Equation 1 can be amended as:

$$I_L = A^{ln} C_1^{a1} C_2^{a2} C_3^{a3} S_1^{a4} S_2^{a5} P_1^{a6} P_2^{a7} E_1^{a8} E_2^{a9} \epsilon \dots\dots (2)$$

I_L = Income of on-farm laborers (USD); C_1 = Education of the on-farm workers (Grades passed); C_2 = Experience in on-farm practices (years); C_3 = Age of on-farm workers (years); S_1 = Social Dummy for Caste harassment; if harassed then $S_1=1$, otherwise=0; S_2 = Dummy for Labor Unions; if Unions are working then $S_2=1$, otherwise=0; P_1 = Physical dummy Occupational health and safety if provided with these $P_2=1$, otherwise=0; P_2 = Human capital dummy specialized if precise training are provided then $P_2=1$, otherwise=0; E_1 = Credit facility in economic context of decent work if available $E_1=1$, otherwise=0; E_2 = Compensational payments are taken as dummies if paid then available $E_2=1$, otherwise=0

Detailed form of double log regression Equation 2 is specified as:

$$\ln I_L = A + \alpha_1 \ln C_1 + \alpha_2 \ln C_2 + \alpha_3 \ln C_3 + \alpha_4 S_1 + \alpha_5 S_2 + \alpha_6 P_1 + \alpha_7 P_2 + \alpha_8 E_1 + \alpha_9 E_2 + \epsilon \dots\dots (3)$$

Results and Discussion

As certified orchards are governed by international certification bodies and high end supermarket retail stores as well as produced premium quality products which generates a high price for growers ultimately generating a huge potential for decent employment conditions. This has led to improved livelihood

conditions at certified orchards with respect to non-certified orchards.

Comparative analysis of global GAP certified versus non-certified orchards

To evaluate the difference between certified and non-certified orchards, a comparative analysis of different socio-economic factors and decent work indicators was done by comparing the percent distribution of different factors that were found to be compatible with social, physical and economic context of decent work.

Seventy four percent were seasonal at non-certified orchards whereas twenty six percent were temporary at non-certified orchards as indicated in Table 1. Eighty three percent of certified orchards' workers were seasonal and seventeen percent were temporary. Hence, more seasonal workers are employed at certified orchards. Eighty six percent of total at certified orchards were employed full year.

Decent work indicators regarding on-farm workers:

Economic upgrading can be derived by social upgrading of on-farm workers in terms of wages as well as in producing high value products with better profit margins in local and international markets. These results represented in Table 1 explained that most of workers in on-farm industry of Pakistan are socially deprived but things are much better on certified orchards because of international compliances and local institutional influences. It was also estimated that labor unions have positive effects on incomes of workers.

There is weighty variance observed among certified and non-certified orchards in rural areas of Pakistan. Hundred percent of workers were found to be unionized on certified orchards and only four point three percent were working under the cover of labor unions on non-certified orchards as indicated in Table 1. Sixteen percent on non-certified orchards said that they have been remunerated with cost effected wages and 10 percent response was observed on certified orchards. Unionization has repercussions for collective bargaining power, social dialogue, social security and ability to speak etc. and many other provisions in decent work agenda.

Compensational payments are paid to persons who got some un-intentional disabilities, diseases injuries during the service period. Due to increasing pressures and obligations by international certification bodies

and government has been focused on special remuneration package for on-farm workers at farm level. It comprises many types of payments including maternity leaves, employment injury benefits, paid leaves etc.

Table 1: Decent Work Indicators and Socio-demographic distribution.

Short statements	Certified orchards (%)	Non-certified orchards (%)	Total Number	%
Workers types				
Seasonal	74.3	83.3	84	42
Permanent	25.7	16.7	115	57.5
Decent work indicators				
Labor unions	100	28.26	66	33
Caste based Harassment	10	15.71	22	11
Professional trainings	66.67	31.43	84	42
Occup. Safety and health	100	4.26	110	55
Compensational payments	66	27.7	94	47
Credit facility	64.3	36.4	148	74
Life styles				
Migrant	36.7	18.6	66	33
Clean water access	94	78	164	82
Three full meals at home	67.1	100	154	77
Mud house	90	60	162	81
Cemented house	10	40	38	19
Owned house	57.14	93.33	136	68
Rental house	42.86	6.667	64	32
Afford children education	81	78	156	86
Joint family	86.7	68.6	148	74
Married	73.3	67.1	138	69
Income (usd)/month				
< 50\$	0	31.4	44	22
50-100\$	13.3	50	78	39
100.1-150\$	23.3	14.3	64	32
150.1-200\$	43.3	2.86	10	5
200.1-350\$	20	1.43	4	2
Experience (years)				
< 10	77.1	46.67	12	6
11- 20	17.14	20	144	72
20 – 25	1.42	22.33	42	21
No experience	4.28	10	2	1
Age (years)				
< 18	0	4.5	18	9
19 – 25	47.1	50	70	35
25 – 35	35.7	26.67	78	39
35 – 45	17.1	23.33	24	12

Source: Author's own labor survey data 2016; **Note:** All frequencies are out of total sample (200).

As, it was described earlier that nearly half of total employment injuries belongs to agriculture sector. This sector seems to be safe with respect to other health hazardous occupations but a majority (nearly half in Pakistan) of workers is constantly receiving employment injuries in this sector. Certified orchards are paying the compensational payments to sixty seven percent of workers as shown in Table 1. Whereas, non-certified orchards' workers are being paid to twenty seven percent of their total workers. Credit facility stands for sixty five percent of certified orchards' workers and thirty five percent to non-certified orchards' workers.

Most well-organized, satisfied and productive labor to improve the work efficiency at farm level can be acquired by motivating them by occupational health and safety measures which includes the following terms chemical separate rooms, safety equipment's, hazard signs, 1st aid boxes, uniforms, hygiene meals, proper sanitation facility, doctor contracts etc. These types of development interventions has consequences for high quality fruit finally for high end stores with minimum pre and post-harvest losses.

These types of physical safety measures for on-farm labor are also helpful in fortification of fruits. As in case of labor intensive instruments like strip-harvester, which is safety equipment for protection of workers from skin cuts but it also preserves the fruit from blemishes and other injuries. All of workers at certified orchards were able to enjoy the occupational health and safety measures but only four percent of total non-certified labor force. Comparative percentages showed that thirty one percent workers belong of non-certified orchards who were specialized to handle specific processes at farm level and known for that special profession as indicated in Table 1. Whereas, frequency of specialized persons at certified orchards was sixty seven percent indicated a higher level of skills to perform job.

Factors regarding lifestyles of workers: Shifting of house type can be assumed as the major indicator for livelihoods improvement in developing countries. Most of farm owner have given places voluntarily to workers to build their houses. Therefore, on-farm workers on non-certified orchards were having ninety percent mud houses whereas certified orchards' workers have sixty percent mud houses as indicated in Table 1. On the other side, certified orchards' workers

occupy forty percent cemented houses unlike the non-certified orchards' workers who have only up to ten percent cemented houses.

Ninety four percent of all certified orchards' workers were claiming that they are the owners of their houses against the non-certified orchards where only fifty seven percent workers call for the ownership of their houses. Forty three percent and seven percent were renting their houses in case of non-certified and certified orchards respectively.

Socio-economic factors: Age of workers showed a little difference between certified orchards workers and non-certified orchards' workers. As shown in [Table 1](#) workers between the ages of 25-35 are fifty percent at certified orchards while on non-certified orchards forty seven percent were found to have that category of age. Twenty six percent of total certified orchard workers were among 25-35, while 36 percent of total 70 workers at non-certified orchards. 17 and 24 percent for 35-45 respectively.

Income percent distribution of workers showed a strong variation among the certified and non-certified orchards. As represented in [Table 1](#) that 30 percent on-farm labor at non-certified orchards relies in income group zero to five thousand while not a single worker of certified orchards. Whereas, 50 percent of non-certified orchards' workers are found to have income group six to ten thousands while contribution of non-certified orchards was 13 percent. Eleven to fifteen thousand income group workers distribution was found to have fourteen and twenty three percent for non-certified and certified orchards respectively as indicated in [Table 1](#). In case of sixteen to twenty thousand group showed percentages were two and forty three percent, for twenty one to thirty five group percentages comparison was one and twenty percent for non-certified and certified orchard's workers respectively.

Experience was measured in number of years of workers dealing with different pre and post-harvest practices in on-farm industry as showed in [Table 1](#). Four percent were having no experience at non-certified while ten percent at certified orchards. Seventy percent were among the experience group one to ten years at non-certified orchards while forty six percent at certified orchards. Nevertheless,

certified orchards were employing more experienced groups than non-certified orchards.

Contribution of certified orchards to employing experience group eleven to fifteen was twenty percent while seventeen percent workers at non-certified orchards belonged to this group. Sixteen percent of certified and one percent of non-certified orchards fall in experience group sixteen to twenty following the [Table 1](#). Not a single worker was found having experience twenty to twenty five years at non-certified orchards. Whereas, six percent of non-certified workers fall in this experience group.

Decent work and livelihoods model (DLM)

In order to check interdependency between decent work factors and Income of on-farm labor, a log-log regression model was employed by means of percent estimates.

In this case, income was involved as dependent variable and was regressed by a number of socio-economic variables and Financial, Social and economic dummies factors who specify decent work practices as explained in the following [Table 2](#). Model has fulfilled all the assumptions which was ensured by using the SPSS (Statistics 22). To check overall significance of estimated multiple linear Regression model, analysis of variances (ANOVA) for included variables was calculated by generating a hypothesis that all coefficients are equal to zero. F value was very high (35.101) with a p-value very low ($p < 0.000$) showing that our model is overall highly significant. It also estimated that in our model there is enough explanatory power in our independent variables to regress income.

Model hit rate was 78.5 % because Coefficient of determination (R^2) showed a value of 0.785 but according to the Basic Econometrics book Adjusted R^2 should be interpreted if regression model has employed more than one independent variables ([Gujarati, 1995](#)). Our decent work regression model stated the value of Adjusted R^2 equal to 0.763 explaining that model is best fit and 76.3% percent of variation in income is caused by change in Socio-economic attributes and decent work variables whereas the other 23.7% is caused by other factors which are not included in this model ([Table 3](#)).

Table 2: *Description of variables used in livelihood model.*

Model variables	Mini-mum	Maxi-mum	Mean	St. De- viation
Income (Pkr)/month (DV)	4800 (48\$)	32000 (320\$)	11046.0 (110.4\$)	6072.01 (60.72\$)
Age (years)	12	45	26.39	7.812
Education (grades)	0	14	4.17	3.660
Experience (years)	0	21	6.00	4.723
Compensational payments	0	1	.39	.490
Occupational health and safety	0	1	.30	.461
Caste harassment	0	1	.22	.416
Labor unions	0	1	.50	.503
Specialized professional	0	1	.30	.461
Credit facility	0	1	.34	.476

Source: *Author's own calculations.*

Table 3: *Results of estimated log-log regression model.*

Model variables	Coeffi- cients	Std. Error	T-val- ue	signifi- cance
Age	.119	.107	1.849	.068*
Education	.139	.031	2.712	.008***
Experience	.121	.040	1.796	.076*
Occupational safety and health	.130	.102	1.371	.174 ^{NS}
Specialized professional trainings	.262	.100	2.795	.006***
Caste harassment	-.181	.064	-3.372	.001***
Labor union	.203	.066	3.000	.003***
Compensational payments	.110	.058	1.924	.058*
Credit facility	.146	.069	2.200	.030**
(Constant)	8.063	.316	25.533	.000***
R ² ; Adjusted R ² ; F-value; Durbin-watson statistics	0.785; 0.763; 36.430; 1.252			

Source: *Author's own estimated model.*

These factors may be economic conditions of farms, Farm Owner's personality traits, market potential, export quota defined by Government, wage rates in labor market, total production of mango during the current year in the country and may be national and international policies etc.

As shown in Table 3 Coefficient of Age expressed a positive relationship with Income and was seen significant at 10 percent level of confidence ($p < 0.10$) explaining that with one percent increase in age will result in boosting of income by 0.11 percent, keeping the effects of other factors constant. It's a general impression that age have a strong correlation with

experience as well as income as indicated in Table 3.

Education included as schooling years was found major regressor for the income of on-farm laborers. In ceteris paribus conditions, coefficient of education indicates that there is a positive relationship among education of labor and Income, was found highly significant at 1% confidence level ($p\text{-value} < 0.01$) and can be interpreted in a way that with one percent increase in schooling years income would increase by 0.13 percent as denoted by Table 3. Education is a major contributor to the socio-economic development of country as well as it increases the aggregate income of people (Griliches and Mason, 1972).

Many previous studies and Economic theories have discovered that people having more experience are more likely to work efficiently (Mincer, 1974).

Coefficient of experience in on-farm industry predicted that with 1% increase in experience increases the income by 0.12 % and showed a positive relationship with wage, and was seen significant at 10 percent level of confidence ($p < 0.10$) in ceteris paribus conditions as shown in Table 3. Experience is a major factor which increases the labor skills to deal with different practices and disorders at farm level and empowers the workers to complete their daily affairs in a superior way.

Decency in value chain affecting livelihoods: To apprehend the causal relations among the social upgrading and economic upgrading is a main question in this regard with respect to value chain food safety and quality standards. No preliminary evidence exists proving that the social upgrading certainly leads to economic upgrading (Locke et al., 2007; Brown, 2007). Whereas, now a days there is great need to unpack this by discovering the relationships among social and economic upgrading (Barrientos et al., 2010). Specially, by inspecting under which circumstances (value chain safety and quality standards) social upgrading proceed towards economic development.

Decent work indicators were incorporated into the model as six dummy variables that were found congruent with ILO decent work framework to assess the interdependency of income (economic upgrading) and decent work (Social, Physical and Human). Most of variables were found having significant impact. Income is taken as dependent variable because

livelihoods can be clarified as integration of lifestyles, accesses and income.

Economic upgrading through decent work: Global production networks (GPNs) are transforming their processes to achieve higher quality with minimum cost. We can suppose another hypothesis for development purpose that what is the interdependency between functional upgrading in economic or social aspect and also in terms of on-farm safety and quality measures. It can also be assumed that economic and social upgrading are positively correlated (Gundersen, 2003). Specifically, when it upturns workers' production capacity and improves flexibility.

Economic upgrading in value chain system involves the practices that improves the economic value of the products which is also highly congruent and implicated by decent work agenda in term of technically skilled and satisfied labor. While in our case with the compulsion of high value products we are courageous to talk about the workers' upgrading in terms of their better economic conditions at farm level. For this purpose, we incorporated two variable (compensational payments and Credit facility) into our model and interdependency among livelihoods and decent work indicators is evaluated.

Most productive and efficient labor can be attained by its gratification at farm as well as after leaving the job or retiring. Compensational Payments was taken as important variable under economic context of decent work. This variable was found showing positive effect on the wage and discovered that workers getting on-farm compensational payments e.g. maternity leaves, sickness leaves, Employment injury benefits and special occasions, are getting more income by 0.11 percent averagely in ceteris paribus conditions at the confidence level of 10% ($p < 0.10$) as shown in Table 3.

Credit Facility at farm level was also incorporated as dummy variable under economic context of decent work to assess its regressing level with income and was having significance effect at confidence level of 5 % ($p < 0.05$) interpreting that income for on-farm workers enjoying credit or loan facility may be improved by 0.14 %average by keeping the effect of other factors constant (Table 3).

Physical and human upgrading through decent work: Sustainable value chain system can be derived

by intermingling ILO sustainable developments goals into traditional value chains especially for small holding actors. Decent work deficits are taken as one of emerging issues in developing agricultural value chains. Global GAP certification system facilitates the implementation of different food quality and on-farm workers safety standards. As described earlier in introduction part that forty five percent of total occupational injuries are directly related to agricultural workers.

Execution of "Occupational Safety and Health Measures" is now an emergent trend on Global GAP certified orchards. A common perception exists that environmental and safety regulations improve the production costs directly, direct effects of these type take over opinions of most of people, but actually it rises economic and social efficiency of farm enterprise by improving its competitiveness pertaining to orchards.

This variable was involved as physical safety indicator for on-farm workers and designates the non-significance effect at 10 percent confidence level (p -value < 0.10) having a P-value of 0.17 and which can be explained significantly at 20 percent confidence level as shown in Table 3. This model forecasts that, in ceteris paribus conditions, availing the charms of chemical separate rooms, safety equipment's, 1st aid boxes, uniforms, hazard signs, hygiene meals, doctor contracts and proper sanitation facility, may have 0.13 percent more income averagely.

While the "Specialized Professional Trainings" was variable covering effect of trainings, found highly significant at a 1 percent of confidence level " $(p$ -value < 0.01). While, p -value was seen 0.006 as shown in Table 3. Model revealed that workers who got regular trainings (should be called as specialized professionals) may impacting income positively which further can be interpreted that average income for workers receiving professional trainings will increase by 0.26 percent by keeping the effect of other factors constant. These type of workers are recognized as skilled agricultural workers. This result cannot be considered out of box due to strong reason as it makes workers to verify their identity in on-farm mango industry like packaging experts, machine operators, strip harvesters, supervisors etc. and in response it contributes openly to career development and eventually income.

Social upgrading through decent work: As described earlier that to apprehend the causal relations among the social upgrading and economic upgrading is a main question with respect to value chain standards. No preliminary evidence exists proving that the social upgrading certainly leads to economic upgrading (Locke et al., 2007; Brown, 2007). Nevertheless, some research studies have highlighted the negative correlation between social and economic upgrading in special conditions when integrated in the Global value chains (Astill and Griffith, 2004; Raworth, 2004). Whereas, now a days there is great need to unpack this by discovering the relationships among social and economic upgrading. Specially, by inspecting under which circumstances (value chain safety and quality standards) social upgrading proceed towards economic development as shown in Table 3.

Researchers should focus less on workplace and more on social aspect of workers (Nuwayhid, 2004). Unionization is assumed as a one of major factor in determination of wage which address the following framework provisions Social dialogue, workers' representation (Collective bargaining, Freedom of association and to organize), which are the main scenarios for personal development and social integration according to ILO sustainable development goal#8 (ILO, 2015). "Labor Unions" was engaged in social context of decent work as first dummy variable to measure its effect on wage and was found highly significant at 1 percent level of confidence ($p\text{-value} < 0.01$) and designates that manual labor employed under the shield of on-farm unionization have positive impact on their wage and understood as labors whom are working at unionized farms may have 0.20 % more income on the average unlike the non-certified farms not allowing labor unions (Table 3).

It is not considered astonishing that "Caste based Harassment" is effecting the income of workers negatively (Social downgrading). According to our model results, Laborers harassed on basis of caste may get on the average 0.18 % decreased income, assuming ceteris paribus conditions. Hence, economic downgrading occurs with workers exploitation at farm level. It is considered as one of major factors during the payment of wages in developing world especially in the South Asian countries (Das and Dutta, 2007; Best and Mamic, 2008).

Highly significant effect was shown by this variable

at 1 percent level of confidence ($p\text{-value} < 0.01$). Consequently, application of regulations relevant to social rights should be recognized by different Governments as stated in ILO decent work sustainable development goal# 8 which will ultimately address as determinants of income. On-farm workers deserve some direct labor laws which are need to be developed by institutional bodies or Government which does not exist as such in our country Pakistan but India has implemented some specified legislations for on-farm labor.

Conclusions and Recommendations

Outcomes of the study can be concluded in a way that social upgrading of workers has implications and potential for economic upgrading of value chain system in terms of premium quality products, decent employment conditions and improved income. However, social upgrading of workers directly leads to improvement in checkups and adoption of occupational health and safety measures.

Decent work determines the effectiveness of various socio economic indicators of on-farm workers' livelihood which ultimately inform the value chain development process. Since the global value chain system drive the certified orchards under the food quality and safety standards, these orchards have more prospective and potential to increase the on-farm workers' livelihood.

- These upgraded and fair mango value chains has adequate prospective to empower the on farm laborers technically and efficiently. Growers should transform their processes towards global certification system which has final implications for laborers' decent employment.
- This case has pursued a most efficient approach to analyze decent work social, economic and physical aspects in GVCs, with regards to the diverse stages of integration of both farms and workers. Hence. There is a great need to ensure that benefits are being incorporated equally among growers and workers.
- Government (Institutional support) should help to develop an extra knowledgeable foundation for scheming and other interventions to promote the both scenarios: sovereign labour union representation of workers; initiatives at farm-level (including buyer concerns about labour practice at farm level).

- While talking about production capacity of different farms, the productivity of Pakistani mango orchards is considerably lesser with respect to the world average production. The main causes of this poor performance are believed to be poor management and an absence of technical skills. So, Laborers capacity building with regard of technical skills as well as economic and social satisfaction should be encouraged.
- Most common challenge in the setting of GPNs is to advance cross-border interventions by promoting international compliances in terms of on-farm labor rights which should be encouraged e.g. Occupational Health and safety checkups and other social and economic indicators of decent work.
- Occupational health and safety standards has been ignored in Pakistan because of incompatible social and economic country profile. A Research and inspection board on Occupational health and safety checkups as well as on decent work practices should be developed which would diagnose and control social and political circumstances of work dealings. Predominantly, our country is in absence state of the political support to get practical outcomes from operative policies.

Novelty Statement

The novelty of this research is that Decent Work determines the effectiveness of various socio-economic indicators of on-farm workers' livelihood which stimulate the value chain development process. However, institutional support particular on farm labour laws are required to achieve sustainable value chain.

Author's Contribution

Mubashir Mehdi: Designed the central theme of this research and specified the study model. Made the overall write-up.

Muhammad Bilal Ahsan: Assisted in review of literature & data analysis

Burhan Ahmad: Helped in the proofreading and data collection

Khuram Nawaz Sadozai: Contributed in data analysis and made the major results write-up.

Gulnaaz Hameed: Helped in the proofreading and provided the technical back-stopping for this research.

Muhammad Asif: Provided the technical back-stopping for this research.

Conflict of interest

The authors have declared no conflict of interest.

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