PRODUCTIVITY OF AGRI-FOOD SECTOR OF SRI LANKA: THE STORY UNSEEN, UNFOLDED OR UNTOLD

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S L J E R

Sri Lanka Forum of University Economists

Abstract

The agriculture sector in Sri Lanka has been perceived by a large proportion of politicians, policy makers, scientists, academia, and general public as a sector with "low productivity". Yet, once the contribution of food and related industries are added, the Agri-Food Sector (AFS) is highly productive and vibrant, just as much as in any economy. Therefore, the political leadership should be aware of the contributions made by the AFS and be cautious in interpreting the productivity estimates made by various agencies, especially on the productivity of agriculture, forestry and fisheries sector in Sri Lanka. Further, the size of the AFS of Sri Lankan economy and the contributions of overall AFS and the sub-sectors, i.e., agriculture, food manufacturing and food service, should be taken into account if contribution to the Gross Domestic Product and to employment is to be more accurately perceived. Identification of productivity of different sub-sectors together with the constraints to improve productivity, would help the government of Sri Lanka in developing strategies to make the process of economic development proceed further and faster.

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INTRODUCTION

"Employing about one fourth of the workforce in agriculture that produces less than one tenth of the Gross Domestic Product (GDP)", is a sentiment expressed repeatedly by a large proportion of politicians, policy makers, scientists, academia, and general public targeting the agriculture sector of Sri Lanka to highlight its low productivity. Such an expression, no doubt, would lead to demoralize key stakeholders in the sector and losing confidence of potential investors. Assessment of performance of sub-sectors in the economy is important for a country to identify the interventions needed when remedying any issue blocking its path for development. Clear identification of the boundaries and the use of correct "yards of measurement" for different components are important to bring the decision-makers and policy-makers on to a common table of negotiations in order to discuss about the country's economy.

Before expressing concerns on the low-productivity of agriculture using statistics reported in the National Accounts, it is important to reiterate what agriculture entails. In the System of National Accounts (SNA)[1], agriculture sector covers only crop and livestock production, and it is listed along with fisheries and forestry sub-sectors, while the food manufacturing and food services are listed under industry and services sectors, respectively. However, the Agri-Food Sector (AFS) is a composite sector consisting crop and livestock production, food manufacturing and food services. If the productivity of AFS is to be assessed, then the value of production and employment in the AFS should be used in the computation. Such information, however, is not directly reported in government publications. Hence, the interested parties tend to do computations of the productivity of the 'Agriculture, Forestry and Fishing' sector using available but incomplete information. The outcome of such calculations will not reflect the actual scenario of the contribution and share of AFS to the GDP owing to misrepresentation of facts thus, providing incorrect basis in designing and execution of the development agenda of the country.

The actual contribution and role of AFS in an economy are different to those of agriculture. It is proclaimed that high employment in agriculture is a characteristic of 'under-development', while growing employment in food manufacturing and food services is a sign of 'development'. The objective of this paper is to approximate the economic size, employment and labour productivity of AFS of the Sri Lankan economy using existing but unexploited official statistics of the government of Sri Lanka.

The remaining sections of this paper are organized as follows. The second section presents the concept of structural transformation in the process of economic development. The third section highlights the concept and measurement of productivity. Computations

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[1] The System of National Accounts (SNA) is the internationally agreed standard set of recommendations on how to compile measures of economic activity.

of labour productivity of different sub-sectors using data reported by the Department of Census and Statistics (DCS) are presented in the fourth section. Finally, the paper argues the need to use a different classification system to better depict the contribution and role of AFS of the economy of Sri Lanka.

LABOR PRODUCTIVITY, STRUCTURAL TRANSFORMATION AND ECONOMIC DEVELOPMENT

Changes across Agriculture, Industry and Services Sectors

The questions of how low-income primitive economies transform into prosperous and more sophisticated economies and the role that the agriculture sector plays in this evolution have been a subject of inquiries by many academics, development workers, policy makers and politicians throughout the world over many centuries. Though the debates and controversies still exist, the findings of both theoretical and empirical studies clearly show that a structural transformation of the economies occurs during the process of economic development. It is clear that the agriculture sector, which held lion's shares of both GDP and employment during the early stages of development of many countries, would shrink as economies move along the path of development. This phenomenon is associated with a relative rise in contributions made by the industry and services sectors.

Sir Arthur Lewis, the Nobel Laureate for Economic Sciences in 1979, presented the dual-sector model to provide a theoretical explanation to the above phenomenon. This model was based on labour productivity in different sectors (Arthur 1954). He postulated an economy consisting of two sectors; a low-productive agriculture sector and a high-productive industry sector. Agriculture has surplus labour, i.e., marginal productivity of labour is either negligible, zero or negative, and hence the exit of labour does not affect its production. During the structural transformation, surplus labour moves out from the agriculture sector to the industry sector. Thus, the latter will expand and make profits that will be re-invested in the same sector. This creates a further increase in demand for labour by the industrial sector. Labour will continue to move out of agriculture until values of the marginal productivities of agriculture and industry sectors become equal. This process leads to economic growth and is associated with a large share of the industry in the GDP and employment.

The Clark-Fisher hypothesis, proposed by Colin Clark and Allen Fisher, highlights the emergence of a services sector after industrialization. It also supports the concept of structural transformation, and argues that the majority of the labour force tends to work in the services sector as countries develop (Karaalp-Orhana, 2019).

It should be noted that the premise of those arguments lies in the relative sizes rather than absolute sizes of different sub-sectors of an economy as it undergoes a structural transformation. It does not indicate a reduction in absolute size of the agriculture sector; rather it will and can grow in size along with the growth of the total economy. For

example, when the size of the agriculture sector in USA increased from US$ 59 billion in 1970 [Gross Value Added (GVA), 2015 prices] to US$ 184 billion in 2018 (GVA, 2015 prices), its contribution to GDP decreased from 1.13% to 0.93% during the same period (FAOSTAT, 2020). In Sri Lanka, too, the economic size of the agriculture sector grew though its relative size reduced over time (Figure A1 - annexed).

Structural Transformation within Agri-Food Sector

During the process of development, a dietary transformation also takes place from unprocessed, subsistence staples to processed, purchased non-staples (Pingali, 2004). The urban consumers with rising incomes demand more nutritious, healthy, convenient, processed and safe food, making food consumption an adventurous experience. This rising demand expands food manufacturing and food services sectors and creates jobs for those who exit from agriculture.

This results in an increased contribution from food manufacturing and food services to the AFS with economic development.

As stated earlier, the size of the AFS in economies is not visible in national accounts of many countries. However, some approximations have been made by various analysts, to this effect. Even in developed economies, the size of AFS is relatively large though their agriculture sectors are small.

The agriculture sector of the USA has contributed 0.6% to the GDP while that of AFS, which adds the contribution of food and related industries (Note: AFS of the USA consists of food and beverage manufacturing; food and beverage stores; food services and eating and drinking places; textiles, apparel, and leather products; and forestry and fishing), was 5.2% of the GDP in 2019. The Agri-Food Canada (2017) also states that the contribution of AFS to the Canadian GDP was 6.7% in 2016, of which, the food retail and wholesale industry accounted for the largest share (1.8%), followed by the food, beverage and tobacco (FBT) processing industry (1.7%). Brazil considers four components in AFS and defines it as the agribusiness sector, i.e. (a) inputs to agriculture, (b) agriculture, (c) agriculture-based industry, and (d) final distribution. In 2017, the contribution of the agribusiness sector to the GDP of Brazil was as high as 19% (PwC, 2019).

Estimates in the developing world, using the limited data available, indicate that the share of the AFS in GDP ranges between about 30% in lower-middle-income countries such as Bangladesh, Egypt, Indonesia, and Viet Nam, and 40-60% in Myanmar and low-income countries in Africa (south of the Sahara). The share of midstream of the AFS is already substantial, i.e., between 19% in India Niger and Egypt and 57% in Egypt, and is growing (Herrendorf and Schoellman, 2015). Christiaensen et al. (2020) reported that the AFS constitutes 10%, 31% and 80% of employment and the agriculture sectors provides employment to 2%, 15% and 73% of the labour force in USA (high-income), Brazil (Middle-income) and Eastern and Southern African countries (low-income), respectively.

A similar pattern was observed by Davis and Goldberg (1957) with respect to employment in AFS. They indicated that though employment in agriculture is reduced, an increase in employment in the food industry and procurement sector can be observed along with technological improvements. According to recent findings of Reardon et al. (2019), a large number of small and medium-sized enterprises (SMEs) in transportation, processing, and distribution enter the industry with food system transformation, as food processing, distribution, and services tend to be more labour-intensive. The labour productivity is relatively high in these sectors and food manufacturing industries have a large potential for creating non-farm employment.

Structural Transformation and labour productivity in the Sri Lankan economy

Figure 1 illustrates how the labour productivity in Sri Lanka has changed during 1978-2019 in terms of output per worker. The data clearly show that over the years, Sri Lankan economy has become increasingly efficient in using its labour.
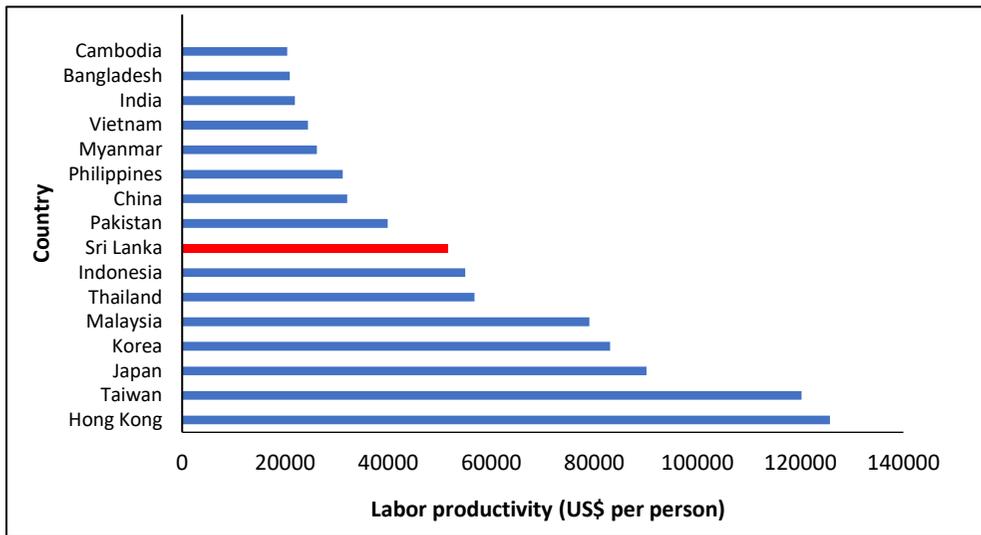
Figure 1: Labour productivity in US$ per person employed (at constant prices 2010) during 1978-2019
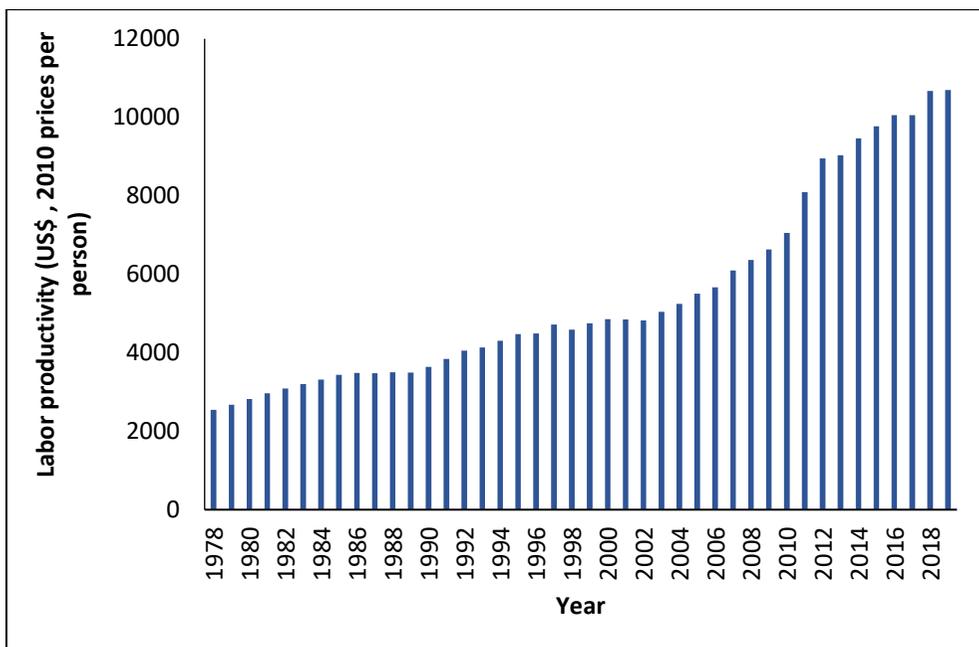
Source: Author's calculations using data presented by the APO, DCS 2020a, World Bank 2020; FAOSTAT, 2020

Figure 2 illustrates the relative position of Sri Lanka in the Asian region in 2017 in terms of labour productivity. Undoubtedly, Sri Lanka is the best performer in the South Asian region. However, the performance is below par compared to that of the advanced economies in the region.

Figure 2: Labour productivity in 2017 in different countries (US$ per person employed) (using, reference year 2017)

Source: Authors' calculation using data presented by the APO 2020

Figure 3: Contribution of the Agriculture to the GDP and Share of Agriculture in Employment: 1978-2019
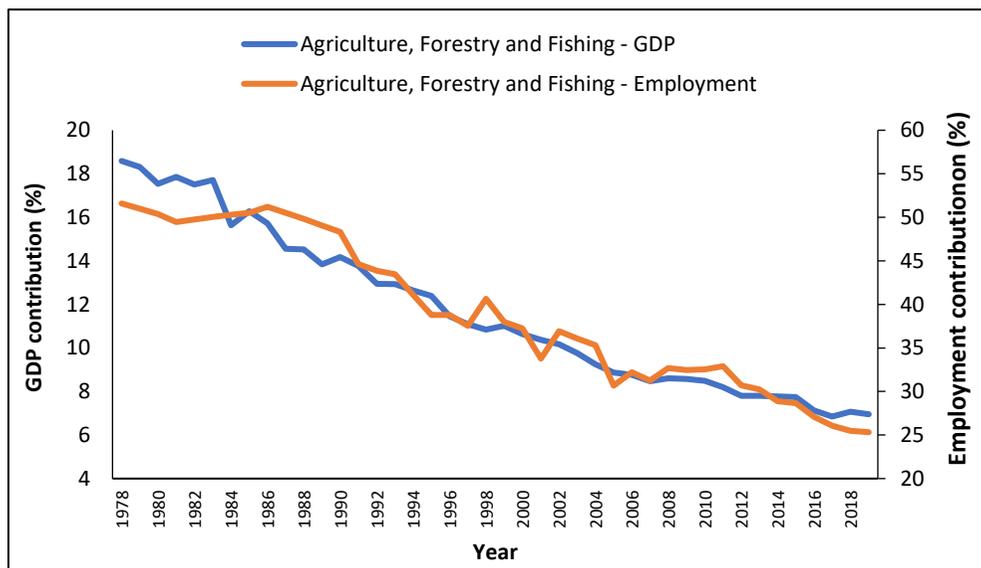
Source: Authors' calculations using data presented by the APO 2020; DCS 2020a; World Bank 2020; FAOSTAT 2020

Figure 3 above illustrates the GDP contribution by the agriculture sector and share of workers in the sector during 1978-2019 as per the statistics reported by the Asian Productivity Organization (APO 2020). The relative shares imply that the agriculture

sector contributes only 7%[2] to the economy, while employing 25% of the labour force of the country in 2019.

A simple computation of labour productivity in Sri Lanka using the GDP contributions and employment data published by the Department of Census and Statistics in 2019 are shown in Table 1. The labour productivity levels of the agriculture sector are thus 0.33, and that the industry and services sectors are 3.48 and 4.44 times more labour productive, respectively, compared to the agriculture sector.

Table 1: Gross Value Added, Employment and Labour productivity by sector in Sri Lanka, 2019.

Variable	Agriculture, forestry and fishing	Industry	Services
Gross Value Added (LKR. Mn)	687,857	2,608,211	5,680,757
Employment (No. of Persons)	2,071,940	2,258,421	3,850,219
Labour productivity (LKR. Mn per Person)	0.33	1.15	1.48

Source: DCS, 2020a, 2020b

These results, if used as they are, indicate that the agriculture sector in combination with forestry and fishing is not competitive enough making the sector un-attractive for investments or to get incentivized by the policy makers.

Two caveats can be identified in the above calculation, which used value of production as the numerator and number of workers as the denominator, have made the results "not-so-acceptable". The first is the way that the numerator has been computed. According to the classification adopted, 'Agriculture, Forestry and Fishing' is defined as the production of plants, animals, fish and forestry products. The large inter-sectoral connections of agriculture, commonly known as AFS, i.e., raw material supply, food processing, and food services, have not been considered under the agriculture sector but are listed under industry or services in the above calculation (Table 1). The second is the way that the denominator has been computed. Agricultural employment is largely informal and part-time[3]. The reported employment data include a large number of workers who have claimed agriculture as their primary employment (DCS, 2019).

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[2] GDP at constant prices, (2010 reference year)

[3] It should be noted that 89% of the workers in the agricultural sector in Sri Lanka is engaged in informal sector occupations, which is characterized by irregular and part time work (DCS, 2019). As a result, the employment figures expressed in man-days can be an over-estimation of the actual number of workers in the sector.

Thus, we attempted to highlight the significance of AFS in the Sri Lankan economy, and to re-compute productivity in the agriculture sector with and without incorporating the food processing sector. In computing the above, we used two types of employment statistics presented by the DCS of Sri Lanka, i.e., conventional and alternative.

ECONOMIC SIZE OF THE AGRI-FOOD SECTOR IN SRI LANKA

Following the SNA, as proposed by the United Nations Statistics Division, Sri Lanka reports only the primary production of crops and livestock in determining the growth and contribution of the sector to the GDP. We argued that in setting development targets and prioritizing investment options, due consideration should be given to the growth and contribution of sectors that are inherently linked to agriculture sector. In this context, we defined AFS as "agriculture and manufacturing of food, beverages and tobacco". This definition, though under-estimates the total contribution of AFS defined in the previous sections, enable us to show the relative size of each the components listed under industry using published information. Figure 4 summarizes the shares of four economic activities namely, (1) services, (2) industry without food, beverage and tobacco manufacturing, (3) food, beverage and tobacco manufacturing and (4) agriculture. The last two sectors largely reflect economic activities of the agribusiness sectors, which was not-so-transparent in national accounts. Based on authors' calculations, the total agriculture sector comprising of (3) and (4) above has contributed to approximately 13% to the GDP of Sri Lanka during 2015-2019, as opposed to low contribution reflected by the conventional calculations considering sub-sector (4) alone.

Figure 4: Share of selected economic activities to the GDP (2015-2019)
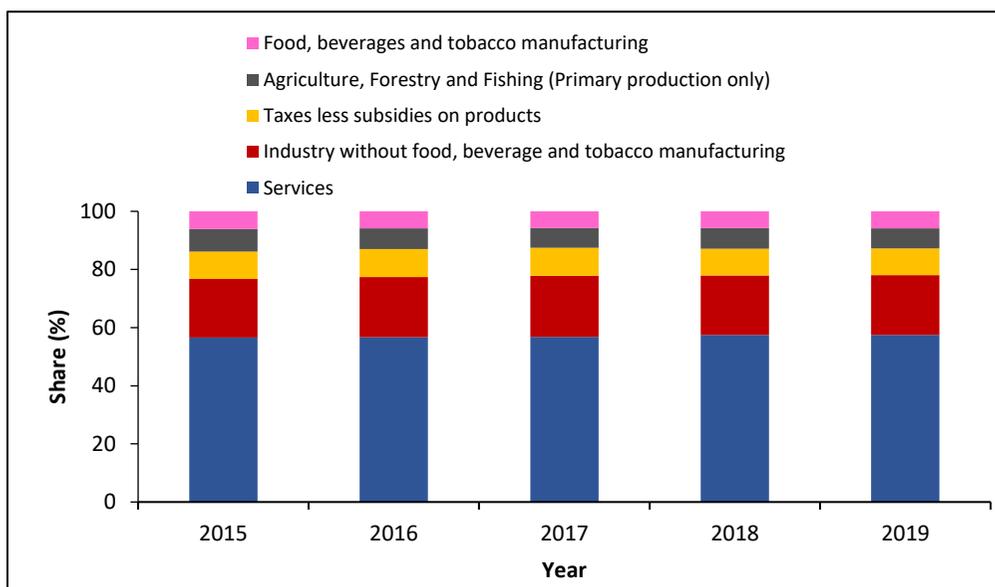
Source: Authors' calculation using data presented by the DCS, 2020b

EMPLOYMENT IN AGRICULTURE: IS IT INFLATED IN CONVENTIONAL STATISTICS?

The DCS is the official source for employment data in Sri Lanka. Conventionally, the DCS treats the preceding week of the survey week as the reference period. The individuals, who worked at least one hour during the reference period, are treated as paid employees, employers, own-account workers or contributing family workers as employed (DCS, 2020b). This also includes individuals with a job but not at work during the reference period. The employment statistics presented and used in this paper up to this section, is based on the statistics of the DCS under the above definition.

Interestingly, the Labour Survey Reports released by the DCS also presents "alternative estimates". In the alternative estimates, persons who work only for 20 hours or more per week are considered to be employed while contributing family workers have not been considered as employed. Those contributing family workers who were reported to seek some other work are considered as unemployed and the rest of the unpaid family workers are considered as economically inactive (not in the labour force). Hence, only the (a) paid employees (b) employers and (c) own-account workers are considered to be employed by the DCS.

Table 2 presents the employment in agriculture sector in conventional statistics vis-à-vis employment according to alternative statistics. It is clear that the measurements made using conventional estimates are smaller than those made using alternative estimates.

Table 2: Employment in Agriculture, Industry and Services as reported by conventional estimates and alternative estimates (number of workers)

Year	Conventional Estimates (Number)				Alternative Estimates (Number)			
	AFF*	Industry	Services	Total	AFF	Industry	Services	Total
2015	2,244,547	2,018,171	3,568,258	7,830,976	1,609,226	1,853,056	3,310,615	6,772,896
2016	2,153,874	2,097,503	3,696,306	7,947,683	1,563,142	1,946,231	3,453,599	6,962,973
2017	2,140,185	2,331,494	3,736,500	8,208,179	1,555,527	2,105,515	3,455,334	7,116,376
2018	2,043,698	2,239,262	3,732,206	8,015,166	1,513,837	2,072,274	3,470,295	7,056,406
2019[4]	2,071,940	2,258,421	3,850,332	8,180,693	1,538,804	2,083,645	3,575,934	7,198,383

*AFF: Agriculture, Forestry and Fishing, Source: DCS, Sri Lanka (2020a, 2016b)

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[4] Based on the employment data during the first, second and third quarters as reported in the Labor Force Survey of the DCS (2020a).

Figure 5 illustrates the relative sizes of labour productivities when different estimates are used as the employment in the respective sub-sector, i.e., conventional (C) and alternative (A). As Marambe (2019) reported, a marginal increase in labour productivity can be observed from 2015 to 2018 when computed using conventional statistics. It is clear from Figure 5 that labour productivities computed using alternative statistics are always higher than what is computed using conventional statistics and it is the highest for agriculture (on average, they are 37%, 9% and 8% higher for agriculture, industry and services, respectively).

Figure 5: Labour productivity in Sri Lanka using alternative definitions for employment.
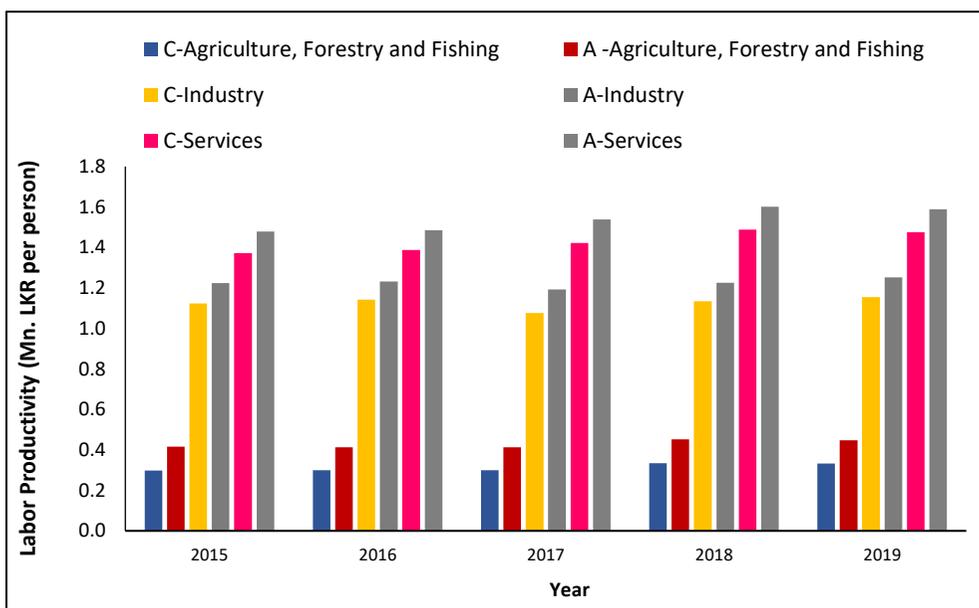
Note: C-Agriculture = conventional estimate for agriculture sector;
A-agriculture = alternate estimate for agriculture sector;
C-Industry = conventional estimate for industry sector;
A-Industry = alternate estimate for industry sector;
C-services = conventional estimate for services sector;
A-Services = alternate estimate for services sector

Source: Author's calculations using data presented by the DCS, 2020a, 2020b and 2016b

EMPLOYMENT IN FOOD MANUFACTURING: LIMITATIONS IN EXISTING SOURCES

A number of government publications provide a few estimates pertaining to employment in the food, beverage and tobacco sector. Table 3 provides the nature of estimates provided in each report. Some differences and similarities in the methodologies adopted in different study reports cited in Table 3 below were noted.

Table 3: Employment in Food Manufacturing and Related Industries in Sri Lanka

Source	Coverage	Data availability	Number of workers (year)*
Sri Lanka Labor Force Survey (LFS) – Annual Report	Manufacturing Sector Employment	Annual	All manufacturing: 1,504,314 (2019)
Annual Survey of Industries (ASI)	Industrial establishments with 5 or more persons engaged	Annual	All manufacturing: 1,400,830 Food: 332,828 Beverage: 10,461 Tobacco: 8,342 (2017)
Economic Census	Non-agricultural enterprises in the formal sector	2013/2014	All manufacturing: 860,075 Food: 198,342 Beverage: 9,878 Tobacco: 5,690 (2013/14)
Economic Census	Non-agricultural enterprises in the informal sector	2013/2014	All manufacturing: 465,380 Food: 111,440 Beverage: 983 Tobacco: 1,732 (2013/14)

The year for which employment figures are presented is in parenthesis

Even though both Sri Lanka Labour Force Survey (LFS) and Annual Survey of Industries (ASI) are conducted by the DCS as annual sample surveys, the ASI covers only the establishments with more than five employees. Therefore, the total employment in manufacturing reported by the LFS is larger and more accurate than that of the ASI.

The Economic Census conducted in 2013/14, though available for a single year, provides the best estimate of employment in the food manufacturing industries, which sums to 328,065 (it was 213,910 in formal industries and 114,155 in informal industries), while the sample survey report of ASI conducted in 2014 shows an employment of 236,899. This indicates an under-estimation of 27.79% in the ASI data.

LABOR PRODUCTIVITY OF THE AGRI-FOOD SECTOR OF SRI LANKA: THE UNTOLD, UNFOLDED OR UNSEEN ESTIMATES OBTAINED USING OFFICIAL STATISTICS OF THE DEPARTMENT OF CENSUS AND STATISTICS

A 'back of the envelope' calculation was done in this study using the GDP contribution and the employment of agriculture and manufacturing of the food, beverage and tobacco sector of Sri Lanka. As the GDP contribution of the food service sectors is not directly

reported in the SNA of Sri Lanka, the AFS was narrowly defined in this study as the sum of the above two sectors. The estimate of employment provided by the ASI were inflated by 28% in calculating labour productivity to account for employment in establishments with less than five workers.

Figure 6: Labour productivity of different sub-sectors of the Sri Lankan Economy; 2014-2017
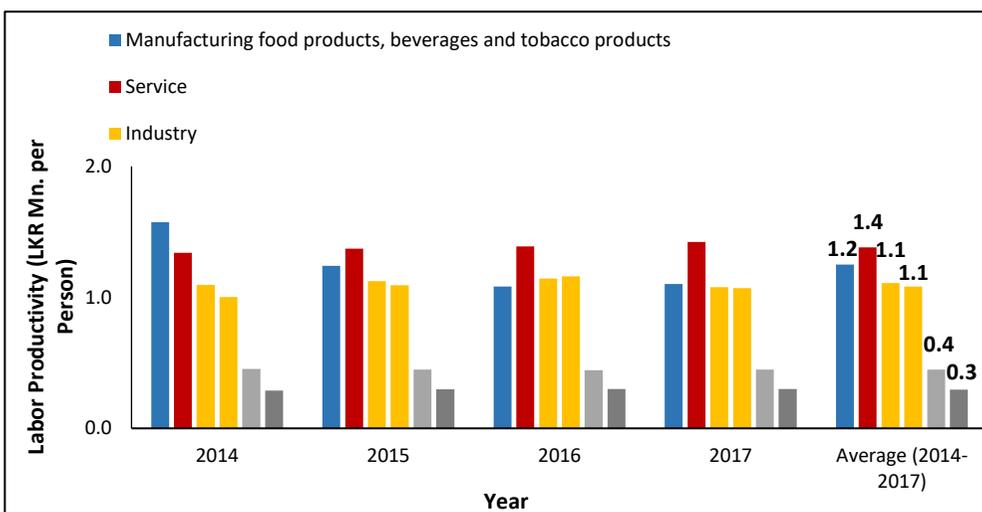
Note: constant GDP (Base year 2010) is used in the calculate the labour productivities are also expressed in constant values and hence they should be treated as indices

Source: Authors' calculation using data presented in DCS 2015, 2016a, 2016b, 2017, 2018, 2019

The calculations were done using the most recent employment data reported in ASI, i.e., for the period 2014-2017. The results clearly show that productivity of the AFS was much larger than that of 'agriculture, forestry and fishing' sector, which is a fact, but not explicitly presented in official government statistics (Figure 6 above and Table A1). This result is driven by the estimate of the manufacturing of food, beverages and tobacco sector, which is more productive than that of the average industry sector. It should be noted that the conventional statistics of employment has been used in the calculation of productivity measures illustrated in Figure 5. If "alternative estimates" were used, the productivity of the AFS would be even higher than what is presented in Figure 6.

THE LEARNING POINTS AND RECOMMENDATIONS

The AFS is a vibrant sector in any economy and Sri Lanka is no exception. The agriculture sector contribution in Sri Lanka has recorded as 7% to the GDP. However, once the contribution of food and related industries are added (Food, beverages and tobacco manufacturing), this share of agriculture sector increased to 13% of the GDP in 2019 and is highly productive. The "Agriculture, Forestry & Fishing + Manufacturing of Food, Beverages & Tobacco" is thus, a more justifiable indicator of the relative contribution of the overall agriculture sector to the economy of Sri Lanka.

The political leadership should be aware of the contributions made by the AFS and be cautious in interpreting the productivity estimates made by various agencies, especially on the productivity of agriculture, forestry and fisheries sector in Sri Lanka. Further computations are to be performed to accurately measure the size of the AFS of the Sri Lankan economy and to measure employment by number of hours of work (instead of number of man days), to identify the highly productive sub-sectors within the AFS and the actual contribution of the total AFS. More detailed data are required to identify the contributions of overall AFS and sub-sectors of agriculture, food manufacturing and food service sector of the economy to GDP and employment.

Identification of productivity of different sub-sectors together with the constraints to improve productivity, could help the national government in developing strategies to overcome the constraints and make the process of economic development proceed further and faster. Experience in other countries demonstrate that the infrastructure and policy investments help the private sector in driving agricultural productivity, opening up markets, and facilitating increased private investment in the manufacturing and services components of AFS, which provides a greater contribution as a country develops, while regulating through government bodies (AGRA, 2019). Roads link farmers to input and output markets, while strengthening the key nodal points in the city region food systems and public investment helps connecting farmers' products to where the demand is. As the processing sector grows, it will create value addition and markets, but will need and seek more raw material supply. An overall policy and regulatory framework would help support this continuum of AFS in Sri Lanka.

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Annexure

Figure A1: Growth of agriculture economy vis-a-vis total economy of Sri Lanka: 1978-2019
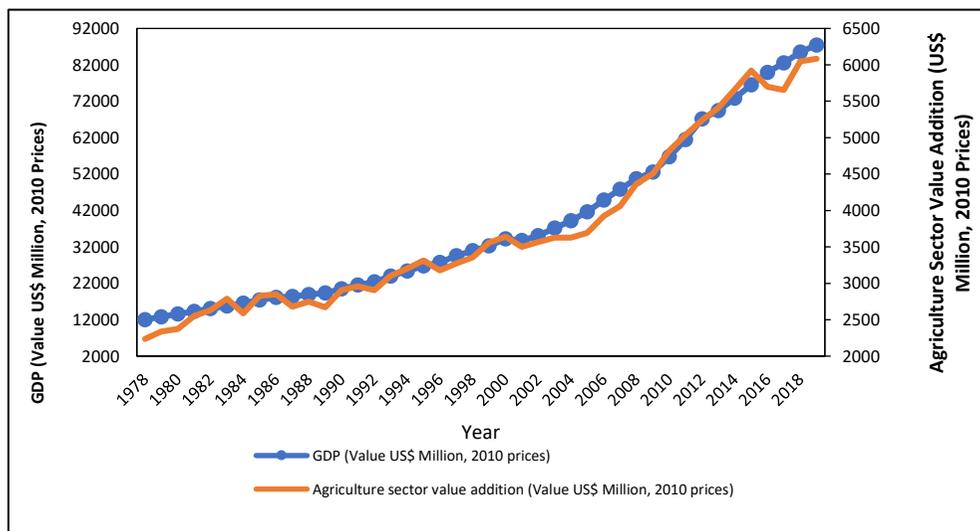
Source: APO (2020)

Table A1: Gross Value Added (GVA)* and employment by production sector during 2014-2017

Economic activity	2014		2015		2016		2017	
	GVA	Labour force	GVA	Labour force	GVA	Labour force	GVA	Labour force
Agriculture, Forestry and Fishing	639,695	2,222,859	669,724	2,244,547	644,654	2,153,874	642,159	2,140,185
Manufacturing food products, beverages and tobacco products	513,960	326,921	528,821	426,000	529,786	489,087	534,923	485,251
Industry	2,218,710	2,027,426	2,267,725	2,018,171	2,396,832	2,097,503	2,509,421	2,331,494
Industry without manufacturing food products, beverages and tobacco products	1,704,750	1,700,505	1,738,904	1,592,171	1,867,046	1,608,416	1,974,497	1,846,243
Service	4,618,501	3,450,205	4,894,717	3,568,258	5,127,615	3,696,306	5,313,434	3,736,500
Agri-Food Sector	1,153,655	2,549,779	1,198,545	2,670,547	1,174,440	2,642,961	1,177,082	2,625,435

*GVA is constant prices (2010 = 100) LKR Mn.

Source: Department of Census and Statistics, Various years