

Fair remuneration assessment in product social life-cycle assessment approaches

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Abstract

INTRODUCTION. It is essential to pay workers fair remuneration that enables them to support their families and have a socially acceptable standard of living. Fair remuneration has been included as a central issue in social life-cycle assessment (S-LCA). This research has been done to gather more information on product S-LCA approaches on fair remuneration, including their compassions and implications on applicability and validity.

THEORY. The United Nations Environment Programme (UNEP) has placed emphasis on and provided definition for 'fair salary' and 'living wage', in particular. A living wage is a wage that enables workers and their families to meet their needs for nutritious food, water, shelter, clothing, education, healthcare, and transport as well as providing for a discretionary income. To assess these needs, Maslow's hierarchy of needs are used as reference. BellagioSTAMP provides system score for the methods.

METHOD. Information of the methods are gathered, on basic information, components included for calculation, data manipulation factor, data sources. The methods are scored from 1-3 for each principle in BellagioSTAMP to provide system score. Nine methods are reduced to four for comparative application analysis using sampling strategy to provide in-depth assessment of the fair remuneration estimates of the four methods using dataset from four methods.

RESULTS. The results show that the methods differ in component choices, data manipulation factors and data sources. They have different system scores based on BellagioSTAMP. FairChain Living Income Reference Price (FC-LIRP) provides the highest estimate of fair remuneration, while Oiconomy Pricing provides the lowest estimate.

DISCUSSION. The difference in the estimates is explained by the differences in needs components included for calculation, reference family size and data sources. All methods follow the UNEP's definition of 'living wage' and cover basic needs such as food, shelter, healthcare, education, and transportation. All methods lack public participation in the development phase.

CONCLUSION. The differences in needs component choices and data sources affect the applicability and validity of the methods. Needs components are often specific to a location and it limits its geographical scope. The reliability and accessibility of data sources has implication on the validity of the methods. The locations that the methods are applied to also limits their applicability on a global scale.

Executive Summary

In the pursuit of fair remuneration for workers in the coffee supply chain, Moyee Coffee undertook a comprehensive analysis of various methods. This analysis aimed to identify the most suitable approach for ensuring fair remuneration for farmers in Mizan, Ethiopia, while balancing the need for profitability. The results of this analysis highlight critical insights and recommendations for Moyee Coffee and other stakeholders.

The study compared four distinct methods for determining fair remuneration, with FairChain Living Income Reference Price (FC-LIRP) emerging as the method with the highest calculated fair remuneration rate for Mizan's farmers. This rate significantly exceeded the current wage levels, offering the potential for improved livelihoods for these workers and their families. However, this also presents Moyee Coffee with the challenge of managing increased production costs while maintaining profitability. It is also worth noting that FC-LIRP has thus far been applied exclusively to farmers, leaving other workers within the supply chain without a fair remuneration assessment. Extending this assessment to all workers could further elevate production costs and requires careful planning and implementation.

One concern pertains to the validity of data, as FC-LIRP allows farmers to determine their own fair remuneration rates. To address this issue, a post-check mechanism using data from alternative methods, such as the Anker Methodology and WageIndicator Living Wage, is recommended. This approach ensures data accuracy and aligns the calculated wages with actual living costs.

Furthermore, FC-LIRP received a BellagioSTAMP score of 18, indicating room for improvement in its overall system. Similar to other methods, FC-LIRP lacks public participation and social engagement during its development phase. Involving farmers and incorporating their perspectives into the calculation process can enhance the method's relevance and effectiveness. For Moyee Coffee to implement FC-LIRP successfully, continuous investment in the method is necessary. This includes regular updates to data and methodology to ensure ongoing applicability and validity. However, it's important to consider the potential cost implications of these investments.

In conclusion, Moyee Coffee's exploration of fair remuneration methods offers valuable insights into ensuring fair remuneration for workers in the coffee supply chain. To navigate the challenges and opportunities presented by FC-LIRP, Moyee should consider extending fair wage assessments to all workers, implementing data validation measures, and involving stakeholders in the development process. With a commitment to ongoing investment and evaluation, Moyee can contribute to the betterment of workers' lives while sustaining its business goals.

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Abbreviations

AFW	Asia Floor Wage
ALW	Alberta Living Wage
AM	Anker Methodology
BellagioSTAMP	Bellagio Sustainability Assessment and Measurement Principles
DLS	Decent living standards
FC-LIRP	FairChain Living Income Reference Price
FWNLW	Fair Wage Network Living Wage
GLWC	Global Living Wage Coalition
IDH	Sustainable Trade Initiative
ILO	International Labour Organisation
LWC	Living Wage Calculator
MIS	Minimum Income Standard
NFNH	Non-food non-housing
NGO	Non-governmental organisation
OECD	Organisation of Economic Development
OP	Oiconomy Pricing
PPP	Purchasing power parity
RLW	Real Living Wage
SDGs	Sustainable development goals
S-LCA	Social life cycle assessment
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environment Programme
USA	United States of America
WLW	WageIndicator Living Wage

Chapter 1: Introduction

The unprecedented level of economic growth and global development has helped lifting a significant number of people out of poverty, at the expense of the environment and the society (Reyes et al., 2017). However, according to Reyes et. al. (2017), the distribution of wealth and income has worsened by the disparity between the return to capital and the payment for labour, which is expected to fall. Indeed, over 50% of the world's working population is suffering from working poverty, when workers are often paid a wage that does not enable them to provide for their families (Haar et al., 2018). They still face challenge to earn enough money to support their families and achieve the socially acceptable standard of living (Swaffield et al., 2018). The estimated global living wage gap is at \$674 billion per year, meaning workers worldwide are that same amount away from meeting their basic needs (Hall & Suh, 2021). Hence, the significance of fair remuneration, which is paying the workers the amount that is enough for them to meet their basic needs, cannot be overstated. Fair remuneration is important not only for workers themselves but also for global sustainable development. Research has shown that raising wages of workers fulfils various sustainable development goals (SDGs) set out by the United Nations (UN) as increasing the wages of the lowest paid workers could contribute to both social and environmental sustainability. Wage increase will raise the income of workers, getting them out of poverty which is directly linked to Goal 1 (no poverty) with the purpose to end poverty in all its forms everywhere. The linkage between fair remuneration and Goal 1 is also shown by Haar et al. (2018). They mentioned that addressing minimum income standards, by raising minimum income to fair level, would tackle poverty, especially for the working poor, and facilitate the development of policy that is more favourable for this group. Moreover, their research also showed that

paying workers a higher wage, preferably to the fair remuneration level, would enable them to have a better work-life balance, improving their mental well-being. The raise in income will also enhance job satisfaction and influence job performance as a result, aligning with Goal 8 (decent work), Goal 3 (good health and well-being) and Goal 10 (reduced inequalities). Finally, passing the increase in wages onto the consumers, resulting in higher prices, would reduce consumption and reduce emissions, meeting Goal 13 of the SDGs (climate action), which aims to combat climate change and its impacts (Mair et al., 2019). Many other studies and research have also highlighted the importance of fair remuneration, especially in terms of sustainable development.

Recognising the significance of fair remuneration, this topic has been included in social life cycle assessment (S-LCA). Neugebauer et al. (2017) state that “income and wages are among the determinant factors for living standards and well-being of workers and their families and thus carry a certain degree of relevance for S-LCA”. The authors also mention that fair remuneration along the life cycle of a product is a powerful measure to estimate related social impacts on workers who are involved in the production. Indeed, fair remuneration is a central issue for S-LCA and plays a key role in judging the fairness of wages in various S-LCA applications (Croes & Vermeulen, 2016; Mair et al., 2018). An increasing number of product S-LCA approaches have been developed to estimate fair remuneration. Among these methods, Moyee Coffee has started its own program to calculate fair remuneration for their coffee farmers. The program is called FairChain Living Income Reference Price (FC-LIRP) which aims to find out the right coffee price for farmers, who suffer from the low market price. One of the aspects included in the calculation is the farmer’s salary, which Moyee has developed a method for the farmers to determine fair remuneration for themselves. Moreover, Moyee is also currently participating in the pilot

project Oiconomy Pricing, partnering with Utrecht University. Oiconomy Pricing is a comprehensive sustainability assessment tool that is still being developed, aiming to discover hidden costs of various products by measuring the distance to sustainable production across ten categories related to people, planet, and prosperity. The product chosen for assessment is a one-kilogram package of roasted coffee from Mizan, Ethiopia. Within multiple aspects considered by Oiconomy Pricing, it also has a method to determine the level of fair remuneration which is different from that of Moyee. Moyee and Oiconomy Pricing are only two of various organisations that have developed or are developing their own methods to estimate fair remuneration, signalling its increasing importance.

Despite the importance of fair remuneration, there is still a significant research gap within the field. Initial literature review has shown that there are different methods with different ways of calculating fair remuneration which will be explained in more detail in the next section. Moreover, a lack of consensus on a universally accepted definition and terminology, a notion that is echoed by Croes & Vermeulen (2016), hinders the progress to address fair remuneration as it creates confusion in calculation, especially for policy making. In science, there is also a knowledge gap in terms of comparison between these methods, limiting their comprehensive understanding as well as application. This scientific gap leads to a knowledge gap for businesses, like Moyee as an example. With so many different methods and lack of a universal standard for these methods, organisations are stuck between using an available method or developing their own, which is the problem that Moyee Coffee is facing. For such a small company, it is very costly for Moyee to develop its own method, but other methods are deemed inappropriate to apply to their farmers as it is hard for Moyee to assess the validity and reliability of these methods.

Consequently, this study aims to bridge these gaps in knowledge and practice by conducting an assessment on product social life-cycle assessment (S-LCA) approaches, using different fair remuneration calculation methodologies as case studies; and comparing them. Due to the lack of consensus, it is important to understand each of these methods clearly, as well as their similarities and differences. With better understanding of each approach as well as their comparison, less confusion is expected, and users can apply the methods fully understanding the characteristic of the method. Moreover, it is also important to understand the validity and applicability of each approach. Hence, this study uses a product assessment case study in the region of Mizan, Ethiopia, where Oiconomy Pricing has already been applied in, to show the implication of each method when they are applied to the same region. This results in the following research question:

How the similarities and differences between product social life-cycle assessment approaches on fair remuneration affect their applicability and validity?

To answer this question, the following sub-questions need to be answered:

- 1. What is the justification and rationale behind the calculation of fair remuneration?*
- 2. What type of data is collected for the method?*
- 3. What are the implications on applicability and validity of the method when it is applied to the case study of workers in the coffee supply chain in Mizan, Ethiopia?*

By answering these questions, one can gain a better understanding of the different product S-LCA approaches on fair remuneration, fulling the knowledge gap mentioned earlier. With this knowledge, more informed decision will be taken to provide workers with at least fair remuneration, so that their basic needs could be met. As Deci & Flaste (1995) stated, if these basic physical necessities to life, such as food, water, shelter, etc. and basic psychological needs, are not met, respectively, the human body and soul will rot away.

As I am doing an internship at Moyee Coffee, with the result of this research, it provides them with more information on the calculation of fair remuneration which could help the company to improve their own method, the FC-LIRP, or consider applying other existing methods on their journey to achieve 100% fair remuneration for the workers in their supply chain.

Chapter 2: Theory

2.1 Literature review

The topic of fair remuneration has been introduced and discussed for a long time, even going back to ancient history. According to Werner & Lim (2016), Greek Philosophers like Aristotle and Plato proposed an income based on needs in the context of the common good and moderated by concern of communal good. For example, Aristotle said that households had to be able to take care of themselves and be self-sustaining, and he assigned the state the responsibility to make sure that the poor was enabled to enjoy a sustainable livelihood (Werner & Lim, 2016). Moving to the medieval time, 'just wage' and 'just price' were in discussion as Aquinas, another influential philosopher, thought that it was moral for humans to seek material possessions and prices must be just, allowing everyone to have access to necessities (Werner & Lim, 2016). According to Jerold Waltman (2004), 'just wage' was the result of the knowing and voluntary agreement of both employer and employee on the wage. Unjust wage was a wage rate that did not allow workers to have a basic standard of living, limiting their chances to be 'virtuous' (Stabile, 2008). A few centuries later, Adam Smith, the classical Scottish economist and philosopher, believed that paying all workers at the fair remuneration level would help the society with increased productivity, wealth distribution and economic growth (Clary, 2009).

In contemporary history, the topic of fair remuneration was also frequently discussed, and Werner & Lim (2016) mention three scholars who did extensive work and made important contribution on this topic – John Ryan (1869-1945), Jerold Waltman (b. 1945) and Donal Stabile (b. 1944). Firstly, according to Ryan (1912), based on Christian tradition, fair remuneration is a natural right of all workers, which is an "imperishable right

to a livelihood from the common bounty of nature” and an “absolute right to at least sufficient remuneration to maintain his life”; and the employers (owners) also have the responsibility to pay their workers a ‘living wage’. Secondly, Waltman (2004) argues that individuals must be “intimately connected to the community, and that their interests are inseparable from those of the community”. He believes that fair remuneration addresses “the twin-problem of (in-work) poverty and inequality, both of which he considers inimical to civic republican ideas” (Waltman, 2004). In his point of view, poverty prohibits individuals from making choices for him or herself and inequality creates a disconnection between the rich and the poor in one society (Waltman, 2004). Finally, Stabile (2008) states his idea on fair remuneration from a moral economy perspective, that wages are “a market estimation of what a worker adds to the production of goods and services that society wants”. Hence, low wages represent low productivity.

Fast forward to the current generation, there is an increasing number of different methodologies to calculate fair remuneration. These are a few examples of current methodologies: the Anker Methodology, the Oiconomy project, and the FC-LIRP by Moyee. The first method, Anker Methodology, was developed by Richard and Martha Anker, who head the Anker Living Wage and Living Income Research Institute, with support from the Global Living Wage Coalition (GLWC) (Anker & Anker, 2017). The second method is the Oiconomy Pricing, which has been developed by Pim Croes and Walter Vermeulen from Utrecht University, the Netherlands (Croes & Vermeulen, 2016). The last example is the FC-LIRP, developed by Moyee with inspiration from an existing method developed by Fairtrade to calculate living income reference price in which Fairtrade applies the Anker Methodology for the estimation of living wage (Peek et al., n.d.). Besides these methods, there are various other approaches developed by different organisations.

2.2 Theoretical background

2.2.1 S-LCA guidelines

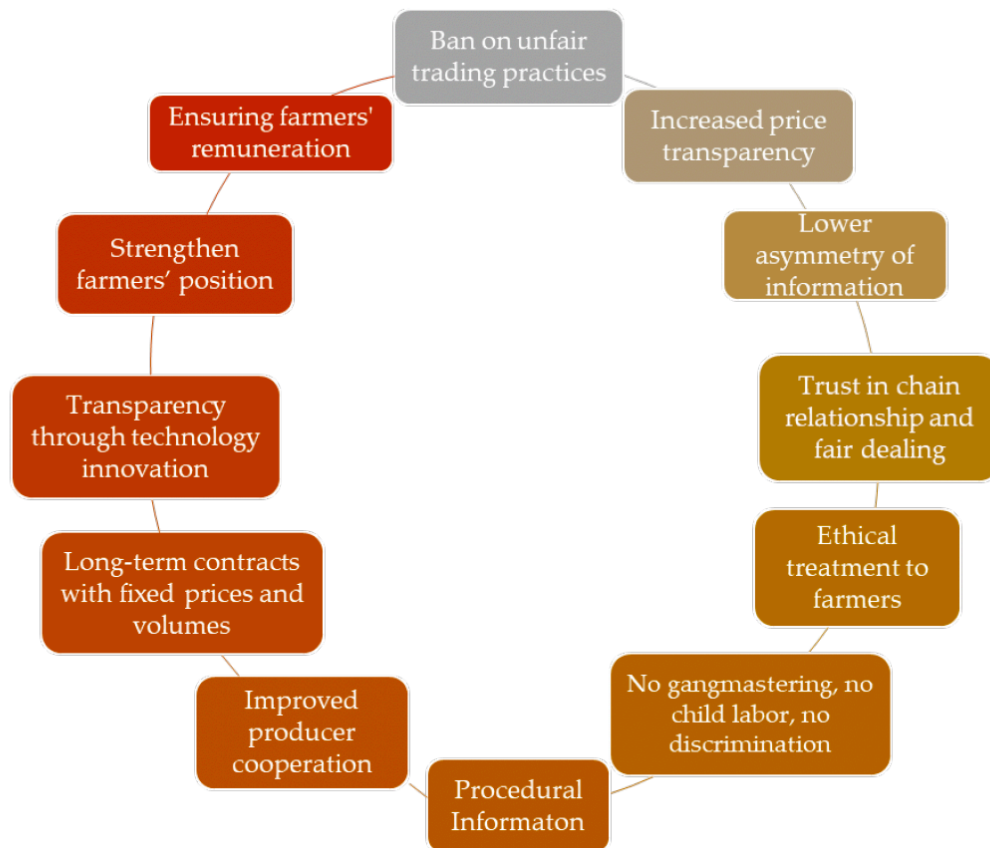
The UN Environment Programme (UNEP) has published and continuously updated the *Methodological Sheets for Subcategories in S-LCA* as supplement to the *Guidelines for S-LCA of Products* that has been published previously in order to guide the application of S-LCA (UNEP, 2021). One of the subcategories is fair salary which relates to the worker as stakeholder. In the methodological sheets, the UNEP defines fair wage as “a wage fairly and reasonably commensurate with the value of a particular service or class of service rendered, and in establishing a minimum fair wage for such service or class of service” (UNEP, 2021). To assess level of wages, three standards have been focused on: the minimum wage required by law; the local prevailing industry wage; and the living wage, which is sometimes referred to as floor wage or non-poverty wage. The last of the three standards of living wage represents fair remuneration for this study. The living wage is defined as “a wage that enables workers and their families to meet their needs for nutritious food, water, shelter, clothing, education, healthcare, and transport as well as providing for a discretionary income” (UNEP, 2021). Fair remuneration is necessary to meet the Universal Declaration of Human Rights, which states that “everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control” (UN, 1948). However, the UNEP also notes the limitations of this subcategories. As assessment of fair remuneration is one of the few qualitative indicators in S-LCA, the quality and availability of data are essential for the quality of the assessment (UNEP, 2021). Data are often available at the country or sector level which

affects the accuracy and granularity of the data. Hence, interpretation and information on context are necessary to use this indicator of fair remuneration appropriately.

2.2.2 Fairness

There is no clear consensus on the definition of 'fair' and therefore it is essential to determine how a wage is considered 'fair'. There have been numerous academic studies on the concept and definition of fairness. Samoggia and Beyhan (2022) distinguish three types of fairness: distributive, procedural, and interactional fairness; in which remuneration is related to the first type: distributive fairness (Samoggia & Beyhan, 2022). Distributive fairness is about outcome distributions and partner contributions; and many researchers link this to the distribution of remuneration among actors. The authors mention the aspiration of all members involved to have a fair and just distribution of outcomes, and the perception of this fairness of outcomes received is distributive fairness. Samoggia and Beyhan (2022) then explore what practices enable fairness and identify twelve key upstream fairness-enabling practices as shown in Figure 1 below:

Figure 1 Twelve fairness-enabling practices in agro-food chain



Note. From “Fairness-enabling practices in agro-food chain,” by A. Samoggia and Z. Beyhan, 2022.

One of the twelve fairness-enabling practices is ensuring farmers’ remuneration, as the study is done on the agro-food system. According to Samoggia and Beyhan (2022), “paying the farmers fairly is one of the most important factors for the improvement and stabilisation of the living standards of the farmers”. This dimension of outcome fairness is defined as payment terms and creating conditions for fair treatment of workers. However, it is important to note that there is a significant difference in payment terms between underdeveloped and developed countries, where workers who work in supply chains serving developed countries are paid much less than those who work in the richer countries (Mair et

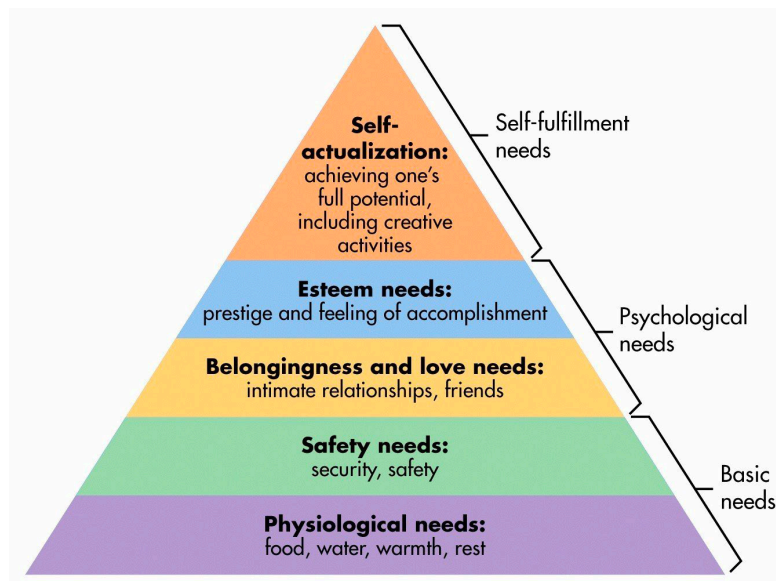
al., 2018). Hence, it is not sufficient to judge fairness based solely on the fact that remuneration is low by international standards. Facing such challenges, the S-LCA community has looked at living wage as an indicator for fair remuneration, playing a key role in judging if the wage is deemed fair in several S-LCA applications (Mair et al., 2018). According to Mair et al. (2018), a living wage provides a widely accepted notion of fair based on four principles: “(1) a wage that provides for a better than subsistence lifestyle; (2) allows a worker to support their family; (3) is earned within a standard working week and does not rely on overtime; (4) and allows for financial security” (Glickman, 1999).

2.2.2 Individual needs vs. national economic statistics

In general, there are two dominant sets of data that product S-LCA approaches on fair remuneration work with: micro and macro data. For the case of micro data, the expenditures of individuals are often studied, with costs consisting of food, housing, non-food non-housing and unforeseen costs (van de Ven et al., 2021). Many approaches use this type of data in estimating the cost of decent life for workers, such as the Anker Methodology. When individual needs are involved, it is important to understand the theories on individual needs and decent standard of living. Figure 2 of the Maslow's Hierarchy of Needs shows the five levels of needs that an individual must fulfil in order: one must fulfil the needs lower down in the hierarchy to reach the higher level of needs. According to McLeod (2018), the bottom four levels are referred to as deficiency needs and the highest level is personal growth needs. Deficiency needs are different from growth needs as they are caused by deprivation that motivates people to meet such needs. The idea of fair remuneration is to provide individual with enough payment so their basic needs are fulfilled, and he or she can pursue higher-levelled needs. The basic needs referred to

here are physiological needs (food, water, warmth, and rest) and safety needs (security and safety). Hence, a product S-LCA approach on fair remuneration must estimate a level of wage that considers these basic needs.

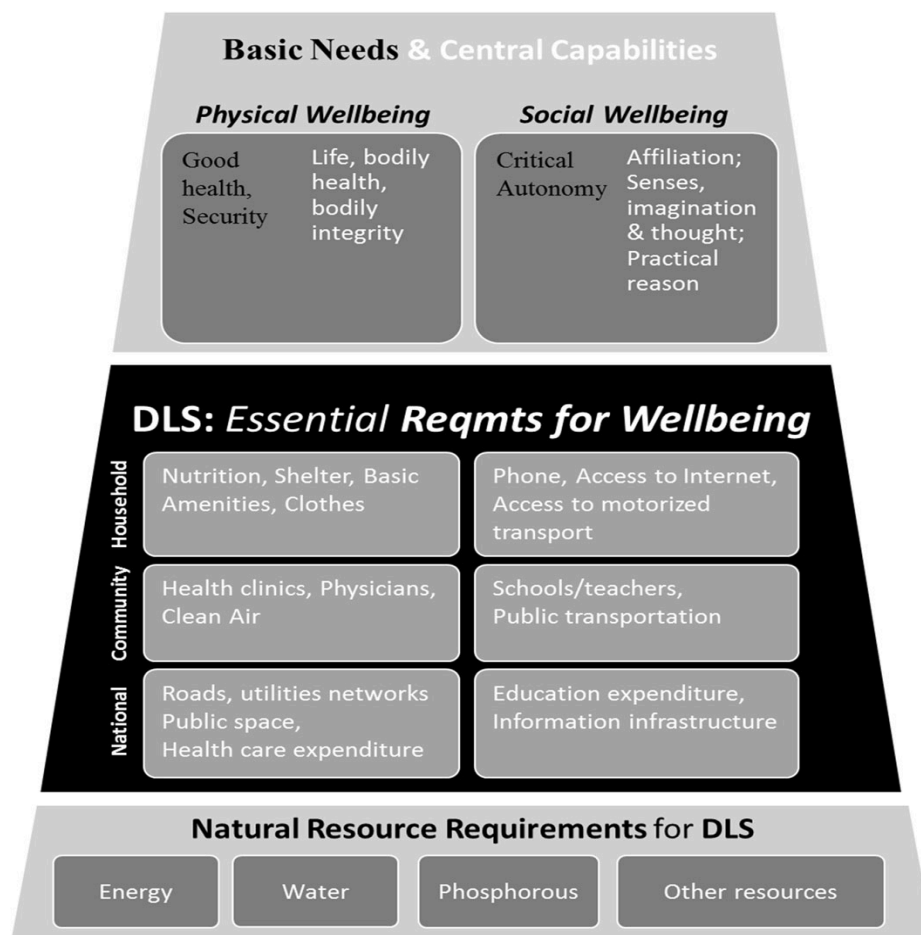
Figure 2 Maslow's hierarchy of needs



Note. From "Maslow's Hierarchy of Needs," by S. McLeod, 2018.

Another perspective in the discussion of individual needs is to look at the material requirements, that allow human to flourish and achieve the decent lifestyle (Rao & Min, 2018). To achieve physical and social wellbeing, one must meet the essential requirement on national, community and household level as shown in Figure 3. These requirements provide the basic of decent living standards (DLS), and for household specifically, these needs are nutrition, shelter, basic amenities, clothes, phone, access to internet, and access to motorised transport. The DLS are proposed by Rao and Min (2018) in a form of a hierarchy of needs that are required by people everywhere and countries are required to provide those.

Figure 3 Decent living standards (DLS): hierarchy of material requirements and their derivation



Note. From “Decent Living Standards: Material Prerequisites for Human Wellbeing,” by N. Rao and J. Min, 2018.

The second approach is to use national economic statistics, which is macro data. This approach relies on historical or cross-sectional national income, productivity, or wage levels in order to find the level of fair remuneration (Shelburne, 1999). According to Joita et al. (2012), the four often used indicator values are national minimum wage, international poverty line of \$2, non-poverty wage, and \$4 a day poverty line. These indicators provide a standard methodology for payment calculation, which can return a value for a fair

compensation of a worker. This approach is used by the Oiconomy Pricing, for example.

However, these two approaches, micro data and macro data, will be studied carefully along with the methods to determine if it is justified to use them for the calculation of fair remuneration.

2.2.3 Sustainability assessment

To assess these different product S-LCA approaches, the Bellagio Sustainability Assessment and Measurement Principles (STAMP) provide the theories and guidelines for sustainability assessment and measurement. According to Pintér et al. (2012), since the early 1990s, many organisations have been involved in the development of indicator systems to tackle socio-economic and environmental problems, and the Bellagio Principles were first developed by a group of experts in order to provide guidance and promote best practice for this movement. Due to changes in policy, science, civil society and technology, update was required for the original principles, resulting in the BellagioSTAMP, which has reduced to 8 principles from the original set of 10 principles. The BellagioSTAMP consists of: (1) Guiding vision; (2) Essential considerations; (3) Adequate scope; (4) Framework and indicators; (5) Transparency; (6) Effective communications; (7) Broad participation; and (8) Continuity and capacity. Table 1 lists out the 8 principles and description of each:

No.	Principle	Description
1	Guiding vision	Assessment of progress toward sustainable development will be guided by the goal of delivering well-being within the capacity of the biosphere to sustain it for future generations.
2	Essential considerations	Assessment of progress toward sustainable development will consider:

		<ul style="list-style-type: none"> - the underlying social, economic and environmental system as a whole and the interactions among its components, including issues related to governance; - dynamics and interactions between current trends and drivers of change; - risks, uncertainties, and activities that can have an impact across boundaries; - implications for decision making, including trade-offs and synergies.
3	Adequate scope	<p>Assessment of progress toward sustainable development will adopt:</p> <ul style="list-style-type: none"> - an appropriate time horizon to capture both short- and long-term effects of current policy decisions and human activities; - an appropriate geographical scope.
4	Framework & indicators	<p>Assessment of progress toward sustainable development will be based on:</p> <ul style="list-style-type: none"> - a conceptual framework that identifies the domains within which core indicators to assess progress are to be identified; - standardised measurement methods wherever possible, in the interest of comparability; - comparison of indicator values with targets, as possible.
5	Transparency	<p>Assessment of progress toward sustainable development will:</p> <ul style="list-style-type: none"> - ensure the data, indicators and results of the assessment are accessible to the public; - explain the choices, assumptions and uncertainties determining the results of the assessment; - disclose data sources and methods; - disclose all sources of funding and potential conflicts of interest.
6	Effective communications	<p>In the interest of effective communication, to attract the broadest possible audience and minimize the risk of misuse, assessment of progress toward sustainable development will:</p> <ul style="list-style-type: none"> - use clear and plain language; - present information in a fair and objective way that helps to build trust; - use innovative visual tools and graphics to aid interpretation and tell a story; - make data available in as much detail as is reliable and practicable.
7	Broad participation	<p>To strengthen its legitimacy and relevance, assessment of progress toward sustainable development should:</p>

		<ul style="list-style-type: none"> - find appropriate ways to reflect the views of the public, while providing active leadership; - engage early on with users of the assessment so that it best fits their needs.
8	Continuity & capacity	Assessment of progress toward sustainable development will require: <ul style="list-style-type: none"> - repeated measurement; - responsiveness to change; - investment to develop and maintain adequate capacity; - continuous learning and improvement.

Table 1 *BellagioSTAMP: Principles for sustainability assessment and measurement* (Pintér et al., 2012)

The BellagioSTAMP has been developed with the aim to provide an effective framework to assess progress toward sustainable development (Pintér et al., 2012). These principles are used in this research to analyse different product S-LCA approaches on fair remuneration, judging whether the approaches in question contribute to sustainable development. How the analysis is done will be explained in detail in the next Chapter 3: Methodology with detailed explanation of each principle.

2.3 Synthesis for this research

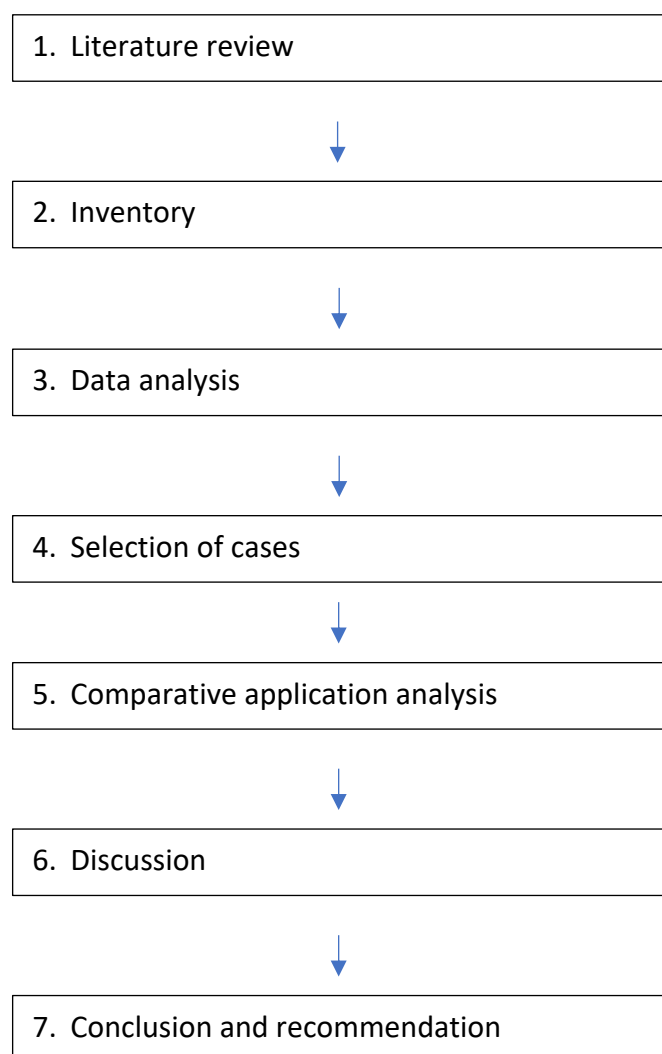
The UNEP places a strong emphasis on fair remuneration as one of the subcategories of the S-LCA guidelines, as well as the Universal Declaration of Human Rights. It is important to assess whether the wage that is paid to the worker is considered to be fair. It is a notion that is also echoed by literature review on fairness, that remuneration must be ensured to be fair for the worker. Based on these emphases, various organisations have involved in developing product S-LCA approaches to measure the level of fair remuneration to create a benchmark or target. These measured benchmarks and targets help with the definition of fairness, which remains ambiguous, to provide more information on what level of

remuneration is studied to be fair. The methodological sheets of the UNEP also mention the limitations on the available data for the assessment on fair remuneration. This research aims to assess the use of data of various methods to gather information on these limitations and how they are addressed. As a worker and his/her family's needs are important in the definition of fair remuneration, the Maslow's hierarchy of needs provide the basis for the discussion on one's needs and how they can be fulfilled. This supplements the S-LCA guidelines, which only provides recognition on the topic of fair remuneration, with a tool to assess the methods in their justification and rationale in choosing which components are included for the calculation. Lastly, the BellagioSTAMP provides another tool to assess these methods on various principles to see whether these methods can be considered as effective methods to measure progress toward sustainable development as an overall system assessment.

Chapter 3: Methodology

To conduct a thorough research, seven steps are taken: (1) literature review; (2) inventory; (3) data analysis; (4) selection of cases; (5) comparative application analysis; (6) discussion; and (7) conclusion and recommendation, as shown in Figure 3:

Figure 3 *Research steps*



3.1 Literature review

The first step of literature review is to get insight into the fair remuneration discussion as well as the increasing number of S-LCA approaches. Step (1) helps gather initial information on fair remuneration and what fair remuneration means, both throughout history and the current generation, as shown in Chapter 1: Introduction and Chapter 2.1: Literature review. In this step, I find that there are currently some knowledge and research gaps, as previously mentioned, which explains the purpose of this research. Moreover, the first step also provides the theoretical background for this research, with the use of the Maslow's hierarchy of needs as well as the BellagioSTAMP, as shown in Chapter 2.2: Theoretical background. Lastly, through literature review, I find that there are nine different methods that aim to estimate fair remuneration, as documented in Table 3 in Chapter 4: Result. This provides the starting point for this research and the next steps explore these methods further.

3.2 Inventory

The second step of building the inventory provides detailed information of the nine methods that have been developed by different institutions, companies or any other market actors who are interested in finding out the level of wage that represents fair remuneration. This step consists of basic information of each method, for example, developer, country of origin, founding year, studied countries or regions, data availability, level of fame, and website. Moreover, this step also provides technical details of the nine methods, such as their data sources and data manipulation factors. More details on this step will be presented in Chapter 4: Result.

3.3 Data analysis

The methods are then analysed in the third step using the BellagioSTAMP mentioned above in Chapter 2: Theory. For each principle, a score from 1 to 3 points is given to the methods, with 1 point as the lowest score and 3 points as the highest score. Within each principle, there are some individual key elements or requirements making up the overall principle. If the method fulfils all of the elements, it gets 3 points. If the method fulfils some of the elements, but not all, it gets 2 points. Lastly, if the method fails to fulfil at least one element, it gets 1 point. To understand the scoring system, each principle is discussed in the following paragraph, looking at what elements or requirements that are there.

The first principle is the **guiding vision**, which says that “assessment of progress toward sustainable development will be guided by the goal of delivering well-being within the capacity of the biosphere to sustain it for future generations” (Pintér et al., 2012). The first element of this principle is whether the method knows what sustainable development looks like. As sustainable development is about looking to the future, the method has to have a vision of what development means for the society. The second element is based on the Stiglitz – Sen – Fitoussi commission who note that the method must inform us about the quantity changes of different factors that matter for future well-being in order to measure sustainability (Pintér et al., 2012). Hence, the method must clearly define well-being and understand the factors contributing to it. For this study, the question is that whether the method understands what fair remuneration could contribute to human well-being in particular and sustainable development in general. The last element is whether participation and social engagement are involved in the development of the above-mentioned vision, as they are important in the vision developing process, ensuring that the assessment is relatable to the people whose progress the method tries to assess.

The second principle of ***essential consideration*** says that “assessment of progress toward sustainable development will consider: the underlying social, economic and environmental system as a whole and the interactions among its components, including issues related to governance; dynamics and interactions between current trends and drivers of change; risks, uncertainties, and activities that can have an impact across boundaries; and implications for decision making, including trade-offs and synergies” (Pintér et al., 2012). The first element is whether the method considers the broad range of social, economic and environmental concerns. The method must also recognise the interconnectedness of these systems, that socio-ecological system needs to be considered as a whole to achieve sustainable development. The second element is to understand the current trends and drivers of change, as well as the links between them so that the method can give alert to unsustainable situations. The third element is whether the method recognises the risks and uncertainties of the assessment, and they must be confronted and included in the assessment as well. The last element is to produce a useful tool that helps decision-making, either on policy-making or influence on the people.

The third principle is ***adequate scope***, which says that “assessment of progress toward sustainable development will adopt: an appropriate time horizon to capture both short- and long-term effects of current policy decisions and human activities; and an appropriate geographical scope” (Pintér et al., 2012). As clearly stated in the description, 2 important elements of this principle are the time scope and geographical scope. Time scope must be adequate to capture both short-term and long-term effect of the current policy decisions and human activities. A long enough time scale would ensure a more accurate anticipation of future trends based on past and current conditions. Moreover, the

appropriate geographical scope must range from local to global scales, that assessment could be not only for the local people but also for people in other parts of the world.

The fourth principle of ***framework and indicators*** says that “assessment of progress toward sustainable development will be based on: a conceptual framework that identifies the domains within which core indicators to assess progress are to be identified; standardised measurement methods wherever possible, in the interest of comparability; and comparison of indicator values with targets, as possible” (Pintér et al., 2012). The first key element of this principle is directly linked to the Maslow’s hierarchy of needs mentioned in Chapter 2 Theories. It is to define which core components are to be considered in the calculation of fair remuneration. This element will be based on how many of the needs mentioned in Maslow’s hierarchy of needs that are covered by the method. The second element is whether the method is standardised so that it would help with comparability in having comparable follow-up measures. The last element is whether the assessment done by the method is compared with available targets or benchmarks.

The fifth principle is ***transparency***, which says that “assessment of progress toward sustainable development will: ensure the data, indicators and results of the assessment are accessible to the public; explain the choices, assumptions and uncertainties determining the results of the assessment; disclose data sources and methods; and disclose all sources of funding and potential conflicts of interest” (Pintér et al., 2012). It is straightforward to see the key elements in this principle. The first element is whether the data, indicators and results gathered using the method are publicly available. The second element is whether method explains its choices, assumptions and uncertainties along the process to get the results. The third element is whether the method discloses its sources of data as well as the methodology. The last element is whether the method discloses the sources of funding and

conflicts between parties as methods often work with clients who might influence the purpose as well as the outcome of assessment. Not disclosing the funding sources could result in public mistrust as people would deem the outcome to be biased towards clients who pay for the assessments.

The sixth principle of ***effective communications*** says that “in the interest of effective communication, to attract the broadest possible audience and minimize the risk of misuse, assessment of progress toward sustainable development will: use clear and plain language; present information in a fair and objective way that helps to build trust; use innovative visual tools and graphics to aid interpretation and tell a story; and make data available in as much detail as is reliable and practicable” (Pintér et al., 2012). This principle is about how the method is communicated to the public. The first key element here is about how the method is communicated to their targeted audience in particular and to the wider public in general, whether the message it tries to convey is clear and whether the language it uses is easy to understand. The second element is whether the information presented is fair and objective, not influenced by any parties or factors. The third element is about the presentation of the information, whether the method uses any visuals or graphics that could help the audience to understand information easier. The last key element is to make the data available in as much detail as possible.

The seventh principle is ***broad participation***, which says “To strengthen its legitimacy and relevance, assessment of progress toward sustainable development should: find appropriate ways to reflect the views of the public, while providing active leadership; and engage early on with users of the assessment so that it best fits their needs” (Pintér et al., 2012). The first element is for the method to have strong and active leadership, providing direction to successfully develop and apply the method while ensuring its continuity. The

second element is to involve the public in the whole process, from development to application. Public participation makes the method more relevant and increases its legitimacy, as well as helping with the use of the results.

The eight and last principle is ***continuity and capacity***, which says “assessment of progress toward sustainable development will require: repeated measurement; responsiveness to change; investment to develop and maintain adequate capacity; and continuous learning and improvement” (Pintér et al., 2012). The first key element of this principle is to repeat the measurement, monthly, yearly, or periodically. The second element is to have a method that is responsive to change, increasing its adaptability to the changing society. The third element is whether the developer of the method continuously invest in the method so that it could be developed, updated, organised, and applied for a long period of time. As the costs of data collection, monitoring, reporting, etc. are high, the developer of the method must have enough budgets to maintain and use the method adequately. The last key element of this principle requires continuous review and revision of the method.

Table 2 below provides the summary of the points mentioned above on the eight principles along with their key elements. Fulfilment of these elements determines the score for each method, and they are presented in the Chapter 4: Result.

Table 2 *BellagioSTAMP and their key elements*

No.	Principle	Key element
1.	Guiding vision	<ol style="list-style-type: none"> 1. Understanding of sustainable development 2. Understanding of well-being 3. Participation and social engagement during vision development
2.	Essential considerations	<ol style="list-style-type: none"> 1. Recognising socio-ecological system and its links 2. Understanding current trends and drivers of change 3. Recognising risks and uncertainties 4. Producing a useful tool

3.	Adequate scope	<ol style="list-style-type: none"> 1. Adequate time horizon 2. Adequate geographical scope
4.	Framework & indicators	<ol style="list-style-type: none"> 1. Adequate conceptual framework that identifies core indicators 2. Standardised measurement methods 3. Comparison with targets or benchmarks
5.	Transparency	<ol style="list-style-type: none"> 1. Data, indicators and results are accessible to the public 2. Clear explanation of choices, assumptions and uncertainties in determining the results 3. Disclosing of data sources and methodology 4. Disclosing sources of funding and conflicts of interests
6.	Effective communications	<ol style="list-style-type: none"> 1. Clear and plain language 2. Fair and objective presentation of information 3. Using visual tools and graphics for presentation 4. Detailed data presentation
7.	Broad participation	<ol style="list-style-type: none"> 1. Strong leadership 2. Public participation in the process
8.	Continuity & capacity	<ol style="list-style-type: none"> 1. Repeated measurement 2. Responsiveness to change 3. Continuous investment 4. Continuous review and revision

3.4 Selection of cases

The third step is to select a certain number of methods for more thorough research. With nine methods currently in use, narrowing it down aids the research process. As this research is done in a specific timeline, having a certain number of methods reduces the amount of time needed for data collection and data analysis. The sampling strategy aims to find a set of methods that represent the product social LCA approaches on fair remuneration as a group but also have some notable conceptual and methodological differences. After searching for product S-LCA approaches on fair remuneration using various terms such as 'living wage calculation', 'decent wage calculation', 'fair wage calculation', 'fair remuneration', there is a high number of methods, with nine examples that are included in this research. It

is essential to develop a sampling strategy to narrow the inventory down to a certain number of case studies for further research, while maintaining the robustness of the research. The first criterion is the applicability of the methods. As for step (5) comparative analysis, comparison is conducted between different methods and the current situation in Mizan, the chosen methods must be applicable for the region of Mizan or at least in Ethiopia, ensuring the validity of the comparison. Besides, another important criterion for selection of cases is the cost of obtaining relevant information and data of all these methods, whether the manuals and explanation of these methods are acquired for zero cost or whether using these methods and obtaining their data sets incur any additional cost. For this research, only methods with no additional fees for data collection are chosen. With these criteria, the initial nine examples are reduced to four, allowing further assessment of these four methods. Details of the sampling strategy and its process will be shown in the Chapter 4.

3.5 Comparative application analysis

The four methods are then compared using comparative application analysis to assess the application and validity of these methods, in addition with the comparison with the current wage situation of workers in Mizan, Ethiopia. The data on the wage of workers at the location are collected through the Oiconomy project that I have worked with as an ambassador for Oiconomy Pricing team of Utrecht University at Moyee Coffee. Oiconomy Pricing is a tool to assess the distance to sustainability of a product, on people, planet, and prosperity (Oiconomy Pricing, 2022). It aims to find the hidden cost of avoiding negative product impacts that the production process often creates on the surroundings, including people and the environment. There are ten sustainability categories that are assessed in the

tool: pollution; depletion of scarce materials; land use; biodiversity and land degradation; waste and end-of-life disposal; economic responsibility; health and safety; labour; corruption and conflict; and various social criteria, in addition with bonus activities. The Oiconomy project collects relevant data specific to Moyee's supply chain on these categories and feeds into the tool to calculate the hidden costs on these categories separately and then the total hidden costs of Moyee. The Oiconomy project provides information on the workers in Mizan and their wages for this research. The wage in reality is then compared with the numbers from the calculation of the four methods. Information of the components included in the calculation of fair remuneration is gathered and compared. This step provides more detail on how different or similar the estimations of each method are to each other and the current situation of wage in Mizan.

3.6 Discussion

With the basic information gathered on the nine product S-LCA approaches on fair remuneration and in-depth comparative application analysis of the chosen four methods, the results are discussed by linking them to the theories provided in Chapter 2: Theory. Implication on the chosen components for calculation of fair remuneration is discussed using the Maslow's hierarchy of needs. The BellagioSTAMP provides the score for the overall system of all the methods. All these information is discussed to provide the implication on the applicability and validity of all methods. More information will be presented in Chapter 5: Discussion.

3.7 Conclusion

Finally, in the last step of conclusion, the research question along with the sub-questions are answered using the information from Chapter 4: Result. Recommendations follow for the S-LCA community as whole on the development and application of fair remuneration. This study is then shared with Moyee Coffee, including a recommendation for the company. This recommendation is based on the comparison between the FC-LIRP and other existing methods using the result from the data and comparative application analysis, then Moyee can decide to make changes to its method or carry on with its projects on fair remuneration using the FC-LIRP. Overall, the company will be able to make more informed decision on the method of it choosing in the future.

Chapter 4: Result

4.1 Inventory

Information on the nine product S-LCA approaches presented Table 3 to Table 12 in this chapter is available in respective Appendix of each method. The tables consist of detailed information of these methods, separating into basic information, components, data manipulation factor and data sources.

4.1.1 Basic information

Initial research shows that there are currently nine notable product S-LCA approaches that work on the estimation of fair remuneration. Table 3 below shows the overview of these methods and the terminology they use for fair remuneration, highlighting the fact that there is no consensus on this mentioned in the previous chapters.

No.	Method	Developer	Terminology
1.	Living Wage Calculator (LWC)	Amy Glasmeier, Massachusetts Institute of Technology	Living wage
2.	Anker Methodology (AM)	Richard Anker and Martha Anker, Anker Research Institute	Living wage
3.	Real Living Wage (RLW)	Living Wage Foundation	Real living wage
4.	Asia Floor Wage (AFW)	Asia Floor Wage Alliance	Living wage
5.	Fair Wage Network Living Wage (FWNLW)	Fair Wage Network	Living wage
6.	WageIndicator Living Wage (WLW)	WageIndicator Foundation	Living wage
7.	Oiconomy Pricing (OP)	Pim Croes and Walter Vermeulen, Utrecht University	Fair minimum wage
8.	Alberta Living Wage (ALW)	Alberta Living Wage Network	Living wage
9.	FairChain Living Income Reference Price (FC-LIRP)	Moyee Coffee	Farmer's salary

Table 3 Product S-LCA approaches on fair remuneration.

Table 3 shows different methods that are currently being used, with different terminologies for fair remuneration. Looking up on Scopus on these different terminologies, the results are mixed. There are 271 documents with the term “living wage” in the title, 86 documents with “fair wage”, 19 documents with “just wage”, 3 documents with “fair minimum wage” and 6 documents with “decent wage”. It seems that the term “living wage” is mostly referred to, but there is no consensus on terminology as mentioned earlier.

Table 4 consists of basic information of the approaches, namely developing organisation, country of origin, actor type, founding year, studied regions or countries and data availability:

Method	Organisation	Country of origin (headquarter)	Actor type	Founded	Countries & Regions	Data availability	Level of fame	Website
Real Living Wage (RLW)	Living Wage Foundation	United Kingdom	NGO	2001*	UK	Data is available in annual reports	1.350.000 results on Google	https://www.livingwage.org.uk/what-real-living-wage
Living Wage Calculator (LWC)	Massachusetts Institute of Technology	USA	University	2003	USA	Data is available for free on the website	158.000 results on Google 2 results on Scopus	https://livingwage.mit.edu
Anker Methodology (AM)	Anker Research Institute	USA	NGO	2005	22 countries	Benchmark studies are available for free on the website	3.300 results on Google 3 results on Scopus	https://globallivingwage.org/about/anker-methodology/
Asia Floor Wage (ALW)	Asia Floor Wage Alliance	India	NGO	2009	11 countries	Data is available for free on the website	20.900 results on Google 5 results on Scopus	https://asia.floorwage.org/living-wage/
Fair Wage Network Living Wage (FWNLW)	Fair Wage Network	Switzerland	NGO	2009*	200 countries	Data is only available by purchase	326 results on Google	https://fair-wage.com/living-wage-database/
WageIndicator Living Wage (WLW)	WageIndicator	Netherlands	NGO	2014	161 countries	Data is available for free for selected countries on the website	16.900 results on Google	https://wageindicator.org/salary/living-wage
Oiconomy Pricing (OP)	Utrecht University	Netherlands	University	2016	183 countries	Fair minimum wage targets are available in publications	2.610 results on Google 6 results on Scopus	https://oiconomy.geo.uu.nl
Alberta Living Wage (ALW)	Alberta Living Wage Network	Canada	NGO	2021	Alberta province, Canada	Data is available in annual reports	1.280 results on Google	https://www.livingwagealberta.ca
FairChain Living Income Reference Price (FC-LIRP)	Moyee Coffee	Netherlands	Business	2022	3 countries	Data is for internal use	3 results on Google	https://www.moveecoffee.com/?lang=en

Table 4 Basic information of nine product S-LCA approaches on fair remuneration.

*= start of campaign or foundation

For country of origin of these approaches or where the headquarters are, eight out of nine approaches are from, or based in high income countries: USA, the Netherlands, Switzerland, Canada, and the United Kingdom. This shows the lack of approaches from middle- or low-income countries, where fair remuneration is needed more than others, as research has shown the minimum wage in those countries are even less than the fair remuneration rates calculated by various approaches (The Living Wage: A Way Out of Poverty | RVO.nl, n.d.-b). In terms of actor types, most of the organisations are NGOs, while only two approaches are from a university (Oiconomy Pricing and Living Wage Calculator), and another is from a company, Moyee Coffee, with *FC-LIRP*.

However, the functions of these NGOs are slightly different from one another, as well as the functions of other actor types. The *Anker Methodology*, for example, was developed by the Anker Research Institute and many other organisations have used the method to calculate fair remuneration estimates for their own purposes. For other approaches, the developers have worked on the methods and calculate the estimates to use for various reasons, for example campaigns, certifications, etc. *Asia Floor Wage* was developed by Asia Floor Wage Alliance and fair remuneration estimates have been calculated specifically for garment workers in Asia, for example China, Vietnam, Pakistan, etc. The estimate is used by Asia Floor Wage Alliance to demand global brands to pay the “gap” between the national minimum wage and the *Asia Floor Wage*, in order to improve wages and working conditions for workers. Another method with the similar purpose is the *Real Living Wage*, overseen by the Living Wage Foundation, which estimates calculated are used to push for higher wages for workers in the United Kingdom and London. Another function of the fair remuneration estimates is for certification. *Fair Wage Network Living Wage* and *Alberta Living Wage*,

developed by Fair Wage Network and Alberta Living Wage Network, respectively, help these NGOs to give certification to employers based on the fair remuneration estimates. For *WageIndicator Living Wage* and *Living Wage Calculator*, the approaches are used as a tool to provide relevant data on fair remuneration calculation and estimates. Moyee Coffee has developed the method to calculate fair remuneration estimates to pay for the workers in their supply chain. *Oiconomy Pricing*, developed at Utrecht University, uses the fair remuneration estimates to calculate preventative costs for products, as one element of a wider full scope sustainability assessment.

In terms of founding year, there is also a variety of starting points of these methods, ranging from 2001 to 2022, emphasizing the history as well as the evolution of the topic of fair remuneration. Many organisations have worked on the approaches for multiple years, while constantly changing or redeveloping them. Others have just started to recognise the importance of fair remuneration and the need for a method for the current situation.

In terms of application and data availability, there are also vast differences between methods. Some methods, like *Oiconomy Pricing*, *Fair Wage Network Living Wage*, *WageIndicator Living Wage*, are applicable for many regions and countries, due to their high applicability or extensive data collection. Other methods, like *Anker Methodology* and *Asia Floor Wage*, are only applied to a small number of countries. For *Anker methodology*, benchmark studies have been done in only 22 countries to provide a sample for data collection and calculation, then other organisations could use the methodology to calculate the estimates for their respective regions because carrying out a full-fledged requires extensive data collection at the region of study. For *Asia Floor Wage*, as it is used to calculate fair remuneration level for countries with garment industry as the main industry, the method is not easily replicated in other countries. And for the rest of the methods, the methods

were developed specifically for the region or country, hence they do not work in other places with different situations.

Furthermore, data availability is essential for the study of the methods as well as their usage. For most of the methods, the data on fair remuneration estimates and related information are available for free, either on the developers' websites or their reports. However, for *WageIndicator Living Wage*, only a limited number of regions and countries are published on their website, while data for the rest of the regions and countries are available for purchase. For this study, it was possible to acquire a set of data from WageIndicator Foundation that is used for the comparative application analysis in later part of this chapter. Lastly, for Moyee Coffee, the estimates of their *FC-LIRP* are available in their report but mostly the data is for internal use which the company uses to pay their workers the fair remuneration level.

4.1.2 Components

Table 5 below consists of the components that are considered for the calculation of fair remuneration estimates for these approaches. For most of the approaches, these components are represented as a basket of goods and services, with differences in the selection of what goes in the basket.

Level	Maslow's Hierarchy of Needs		Method										
			Component	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP	
1	Physiological	Food	Food	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
			Alcohol (moderate)	Y	N	Y	N	N	N	N	N	N	N
		Water	Water	Y	N	Y	N	Y	Y	Y	Y	N	N
			Warmth	Y	Y	Y	Y	N	Y	Y	Y	Y	N
		Rest	Housing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
			Utilities & Fuel	Y	Y	Y	Y	Y	Y	N	Y	N	
			Furnishings & household equipment	Y	N	Y	N	Y	N	N	Y	N	
Household supplies	Y	Y	Y	N	Y	Y	N	Y	N				
2	Safety	Security	Savings	N	N	N	Y	Y	N	N	N	Y	
			Pension	Y	N	N	Y	N	Y	N	N	N	
			Unforeseen events	Y	N	Y	N	Y	Y	N	Y	Y	
		Safety	Healthcare	Y	Y	Y	Y	Y	Y	Y	Y	Y	
3	Belongingness & love	Intimate relationships & Friends	Maternity care	N	N	N	Y	N	N	N	N	N	
			Childcare	Y	Y	N	Y	Y	N	N	Y	N	
			Communication (Phone, internet)	Y	Y	Y	N	Y	Y	N	Y	N	
4	Esteem needs	Prestige & Feeling of accomplishment	Personal care	Y	Y	N	N	N	Y	N	Y	N	
			Civic engagement	Y	Y	N	N	N	N	N	Y	N	
			Recreation & culture	Y	Y	Y	Y	Y	N	N	Y	N	
5	Self-actualisation	Achieving one's full potential, including creative activities	Education for children	N	Y	Y	Y	Y	Y	Y	Y	Y	
			Education for adults	N	Y	N	N	Y	N	N	Y	N	
			Transportation	Y	Y	Y	Y	Y	Y	Y	Y	N	
			Tax & Benefit	Y	Y	Y	N	N	Y	N	Y	N	

Table 5 Product S-LCA approaches' components based on Maslow's hierarchy of needs.

These components are grouped into the five levels of needs based on Maslow's hierarchy of needs. As mentioned in Chapter 2: Theory, these levels of needs are 'physiological'; 'safety'; 'belongingness and love'; 'esteem needs'; and 'self-actualisation'.

Firstly, '**physiological needs**' consist of food, water, warmth, and rest. The components of food and alcohol fall into food needs, water for water needs, clothing for warmth needs, while housing, utilities & fuel, furnishings & household equipment, and household supplies for rest needs. Secondly, '**safety needs**' include security and safety. Security needs consists of components like savings, pension, and unforeseen events, while healthcare relates to safety needs. Thirdly, maternity care, childcare, and communication (phone, internet, etc.) belong to '**belongingness & love needs**', which are intimate relationships and friends.

Fourthly, the next level of the hierarchy of needs is '**esteem needs**': prestige and feeling of accomplishments. Personal care, civic engagement, and recreation & culture relate to this

level of needs. Lastly, the highest level of needs is '*self-actualisation*': achieving one's full potential, including creative activities. Education for children, education for adults and transportation fall into this group of needs. The last component of tax & benefit does not belong to any level of needs, as it does not relate to any needs mentioned in the hierarchy. However, it is an important component that is included in the fair remuneration calculation for many approaches as it is statutory deduction from the workers' wages.

The first finding represented in Table 5 is that most of the approaches fulfil all five levels of the hierarchy of needs, having at least one component in the levels. This means that most of the approaches conduct their calculations that, in theory, could provide decent living for the workers by fulfilling the needs categorised by Maslow. However, there are outliers like *FC-LIRP* and *Oiconomy Pricing*. For *FC-LIRP*, it does not fulfil level 3 and 4. The reason for this is that *FC-LIRP* lets the farmers in their study decide their own salaries, as well as their own basket of needs, making this basket vary between different group of farmers. For *Oiconomy Pricing*, it is different from other approaches as it uses macro data instead of micro data, meaning that it makes use of the available poverty line as the basis for the calculation of fair remuneration but not the basket of needs. It chooses the World Bank's \$2 at 2005 US\$ PPP moderate international poverty line to calculate the absolute fair minimum wage, as the bottom cut-off from the relative fair minimum wage of 44.4% of a country's GNI per capita. This international poverty line is the median poverty line across a sample size of 75 countries' national poverty lines (Ravallion et al., 2008). All these countries have different methods of calculating their poverty lines but most of the methods base their calculations on the basket of needs method. Hence, although *Oiconomy Pricing* has a different approach from other eight methods, it also indirectly takes into account the basic components listed in Table 5, which are assumed to be food, water, clothing, housing,

healthcare, education for children and transportation. For other components, it is unknown which components are included in the calculation of this method.

Another finding is the similarity in component choices between the approaches. Some components in the basket of needs are included in all approaches. These components are food, housing, and healthcare. Looking at the methodology manuals of each method, it is reasonable that all approaches spend much emphasis on these three components, which will be explained later. Moreover, these three components belong to the first two levels of the hierarchy of needs, which one must fulfil in order to move to the next level (McLeod, 2018).

The next finding is an interesting finding that two of the approaches have alcohol consumption in their calculation. For alcohol, only the *Anker Methodology* and *Real Living Wage* take into account this component. However, they both mention that the consumption of alcohol is calculated at the moderate level as extensive use of alcohol is not encouraged. For maternity care, only *Asia Floor Wage* considers this component. For education for children, only *Real Living Wage* does not include this component.

In terms of tax and benefit, the methods are different from each other. Some consider this component in their calculation of fair remuneration, reflected in their estimates. Others do not include this so for the application of the provided estimates, users have to factor in the tax and benefit by themselves, according to rates of tax and benefit stated by a country or region.

4.1.3 Data manipulation factor

Table 6 below consists of the various data manipulation factors used by the approaches. These factors affect the calculation of fair remuneration estimates for each

approach, showing different estimates, or are used to weight some components in the basket of needs. Some approaches calculate just one estimate for fair remuneration, while other provide a wide range of estimates based on these factors. The factors used are **family size, workers per family, working hours** and **geographical locations**.

Method Manipulation factor	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Family size/type	Weighted average rate and rates of 17 household types	12 family compositions	Local average household size	3 consumption units (1 consumption unit = 1 adult or 2 children)	2 adults + local fertility rate	3 family types	2 adults + 2 children	Single weighted average rate and rates of 3 household types	Local average household size
Workers per family	1 & 2	1 & 2	1-2	1	Local employment rates	1,5 - 1,8	1 main worker earning 2.12 times a living income	1 & 2	1
Working hours	1950-h work year	2080-h work year	Standard working hours per country	2496-h work year	X	Standard working hours per country	1864-h work year	1820-h work year	Ful-time farmer
Geography	Regional & national	County, metropolitan area, state, regional, national	Regional	National & cross-country	Regional & national	Regional & national	National	Local	Local

Table 6 Manipulation factor of nine product S-LCA approaches.

The factor of workers per family varies among factors. Most of the approaches assume between one and two workers per family, while *Fair Wage Network Living Wage* use the local average or the employment rates to determine the number of workers per family. The *Anker Methodology* and *WageIndicator Living Wage* also use local information to determine the numbers of workers per family but cap the number to be between 1-2 for the *Anker Methodology* and 1,5-1,8 for the *WageIndicator Living Wage*.

For family size, *Asia Floor Wage* and *Oiconomy Pricing* use the composition of two adults and two children for their calculation. For *Anker methodology* and *FC-LIRP*, they collect secondary data from online research and local surveys to find out about the average household size. *Fair Wage Network Living Wage* applies the composition of two adults plus the local fertility rate to determine household size. For the rest of the approaches,

calculation of fair remuneration estimates is done for multiple household sizes: 12 compositions for *Living Wage Calculator*, three for *Alberta Living Wage*, 17 for *Real Living Wage*, and three for *WageIndicator Living Wage*. The difference is that *Living Wage Calculator* and *WageIndicator Living Wage* publish different estimates for different household types, while *Alberta Living Wage* and *Real Living Wage* calculate both the weighted average as well as individual estimates for all family compositions.

Another factor used as the basis of calculation is the working hours. All approaches agree on a single working hour standard for their method, but this standard varies among approaches as shown in Table 6 with different numbers of working hours.

The last factor used is the geography locations. *FC-LIRP* and *Alberta Living Wage* calculate the estimates for the local group or community; *Anker Methodology* provides estimates for a region; *Fair Wage Network Living Wage*, *Real Living Wage* and *WageIndicator Living Wage* provide estimates at the regional and national level; while *Asia Floor Wage* and *Oiconomy Pricing* come up with the estimates at the national level, including cross-country estimates for the *Asia Floor Wage*. *Living Wage Calculator* is different from the rest as it calculates fair remuneration estimates for the county, metropolitan area, state, regional and national levels. In summary, the data manipulation factors affect how the calculation is done and how the estimates are presented. The *Anker Methodology*, *Asia Floor Wage*, *FC-LIRP*, *Alberta Living Wage* and *Oiconomy Pricing* present a single estimate for the predetermined household size and the number of workers per family. *Fair Wage Network Living Wage* also presents a single estimate but for regional and national level separately. *WageIndicator Living Wage* presents regional and national estimates for each of the three family types, while *Real Living Wage* presents regional and national estimates for both the weighted average and each of the 17 household types. Lastly, the *Living Wage Calculator*

presents the estimates for county, metropolitan area, state, regional and national levels and for each of the 12 family compositions.

4.1.4 Data sources

Data sources used for each component from the nine methods are separated into five tables: Table 7, 8, 9, 10 and 11, according to the five levels in the Maslow's hierarchy of needs. Detailed explanation of the data sources is included in the Appendix of the respective method. As shown in the tables below, these methods have various different sources of data for the components that they include in the calculation of fair remuneration. This is shown by the different highlighting of each cell in the table. The highlighted cells are secondary data collected from available reports, surveys, studies, etc., that have previously been done or constructed. The non-highlighted cells are primary data that the methods have to collect using surveys, visits, or focus groups.

Method	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Methodology									
Food	Minimum Income Standard (MIS) research	USDA's low-cost food plan national average	Model diet (FAO & WHO guidelines/local survey) Local food prices (survey)	Food basket surveys (3000 calories intake per day threshold)	Model diet (FAO & WHO guidelines) Consumption patterns & habits survey	FAO food balance sheets & WHO Cost-of-Living Survey	World Bank's international poverty line	National Nutritious Food Basket	Focus group
Alcohol	MIS research	X	Ratio of NFNH from household expenditure survey	X	X	X		X	X
Water	MIS research	X	Housing	X	Expenditure survey	Cost-of-Living Survey		X	X
Clothing	MIS research	National expenditure data by household size	Ratio of NFNH from household expenditure survey	Non-food costs (55% to 45% of food costs)	X	Cost-of-Living Survey		Survey of Household Spending	X
Housing	UK Housing Review	HUD Fair Market Rents estimates	Local standard for healthy housing (national & international standards) Local housing conditions (visit) Local housing costs (survey)	Non-food costs (55% to 45% of food costs)	UN Habitat criteria Average prices & costs of utilities (survey)	Cost-of-Living Survey		Housing Market Information Portal Square One estimates Canadian Rental Housing Index	Focus group
Utilities & Fuel	MIS research	HUD Fair Market Rents estimates	Housing	Non-food costs (55% to 45% of food costs)	Expenditure survey	Cost-of-Living Survey		Cost Comparison Tool	X
Furnishing & household equipment	MIS research	X	Ratio of NFNH from household expenditure survey	X	Expenditure survey	X		Market Basket Measure multiplier for Other expenses (75.4% of food & clothing)	X
Household supplies	MIS research	National expenditure data by household size	Ratio of NFNH from household expenditure survey	X	Expenditure survey	Cost-of-Living Survey		Market Basket Measure multiplier for Other expenses (75.4% of food & clothing)	X

Table 7 Data sources of nine product S-LCA approaches (level 1)

Method Methodology	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Savings	X	X	X	Non-food costs (55% to 45% of food costs)	Expenditure survey	X	World Bank's international poverty line	X	Focus group
Pension	5% of qualified earnings	X	X	X	X	Cost-of-Living Survey		X	X
Unforeseen events	Inflation $\pm 3\%$	X	5%	Non-food costs (55% to 45% of food costs)	15-20%	5%		2 weeks' pay	Focus group
Healthcare	MIS research	National expenditure estimates by household size Health Insurance Component Analytical Tool	Ratio of NFNH from household expenditure survey Post checks: Local information on healthcare costs	Non-food costs (55% to 45% of food costs)	Expenditure survey	Cost-of-Living Survey		Alberta Blue Cross (health insurance) lowestrates.ca (life insurance) PolicyAdvisor (critical illness insurance)	Focus group

Table 8 Data sources of nine product S-LCA approaches (level 2)

Method Methodology	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Maternity care	X	X	X	Non-food costs (55% to 45% of food costs)	X	X	World Bank's international poverty line	X	X
Childcare	Family and Childcare Trust's data	State market rate surveys County-level childcare provider cost data	X	Non-food costs (55% to 45% of food costs)	Expenditure survey	X		Actual costs of local providers	X
Communication	MIS research	Geographic analysis	Ratio of NFNH from household expenditure survey	X	Expenditure survey	Cost-of-Living Survey		Cheapest available mobile service	X

Table 9 Data sources of nine product S-LCA approaches (level 3)

Method	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Methodology									
Personal care	MIS research	National expenditure data by household size	X	X	X	Cost-of-Living Survey	World Bank's international poverty line	Market Basket Measure multiplier for Other expenses (75.4% of food & clothing)	X
Civic engagement	MIS research	National expenditure data by household size	X	X	X	X		Market Basket Measure multiplier for Other expenses (75.4% of food & clothing)	X
Recreation & culture	MIS research	National expenditure data by household size	Ratio of NFNH from household expenditure survey	X	Expenditure survey	X		Market Basket Measure multiplier for Other expenses (75.4% of food & clothing)	X

Table 10 Data sources of nine product S-LCA approaches (level 4)

Method	RLW	LWC	AM	AFW	FWNLW	WLW	OP	ALW	FC-LIRP
Methodology									
Education for children	X	National expenditure data by household size	Ratio of NFNH from household expenditure survey Post check: Local information on children's education	Non-food costs (55% to 45% of food costs)	Expenditure survey	Cost-of-Living Survey	World Bank's international poverty line	Actual costs of post-secondary education options (including parent education)	Focus group
Education for adults	X	National expenditure data by household size	X	X	Expenditure survey	X			X
Transportation	MIS research	National expenditure data by household size	Ratio of NFNH from household expenditure survey	Non-food costs (55% to 45% of food costs)	Expenditure survey	Cost-of-Living Survey		Driving Costs Calculator	X
Tax & Benefit	Resolution Foundation micro-simulation model's calculation	Federal & state taxes	Income taxes Social security taxes Union fees	X	X	Country-level tables of taxes by income brackets & social security brackets		Tax deductions Tax credits Government benefits	X
Update frequency	Annually	Annually	NA	2-3 years	Annually	Quarterly		NA	Annually

Table 11 Data sources of nine product S-LCA approaches (level 5)

The first finding, as previously mentioned, is that these methods vary in the source of their data, separating into primary data and secondary data. *Real Living Wage*, *Living Wage Calculator*, *Oiconomy Pricing* and *Alberta Living Wage* are the methods that use entirely secondary data. *Oiconomy Pricing* makes use of the available \$2 moderate international poverty line constructed by the World Bank. For the other three methods, they use the national or regional data that have been collected by other parties, such as NGOs or government agencies.

Anker Methodology and *Asia Floor Wage* use both primary and secondary data for their calculation. They both construct their own model diet based on available international guidelines and local food prices collected by their surveys. For *Anker Methodology*, it collects its own data on housing. For the rest of the components, it makes use of ratio of non-food non-housing (NFNH) costs that is calculated based on the local household expenditure survey. However, it also collects primary data on education and healthcare so provide post checks for these individual components. It then makes changes to the preliminary estimates calculated by applying the ratio if its research shows the amount provided for these components is too low or too high. For *Asia Floor Wage*, it applies the ratio of 55%:45% of non-food costs to food costs to estimate the other components in its calculation, apart from food component. This ratio is derived from previous expenditure surveys by other parties.

For *Fair Wage Network Living Wage*, *WageIndicator Living Wage* and *FC-LIRP*, they use primary data entirely for their calculation. *Fair Wage Network Living Wage* and *WageIndicator Living Wage* conduct their own expenditure surveys, or Cost-of-Living survey as named by *WageIndicator*, to collect up-to-date and regional-specific data on the costs of the components included in their calculation. For *FC-LIRP*, the developers organise focus group with selected farmers to gather information from these farmers on their specific expenditures on the relevant components.

In terms of update frequency of data and estimates, the nine methods are also different from each other. For *Real Living Wage*, *Living Wage Calculator*, *Fair Wage Network Living Wage*, *WageIndicator Living Wage* and *Alberta Living Wage*, data is updated annually, with *WageIndicator* updating its data quarterly if necessary. For *Asia Floor Wage*, its estimates are updated once every two to three years. For *Anker Methodology*, some of its original benchmark studies have been updated once while others have not. And for

Oiconomy Pricing and *FC-LIRP*, their datasets have not been updated from their original report or study.

4.2 Data analysis - BellagioSTAMP

As mentioned in the Chapter 3: Methodology, to conduct data analysis, these nine methods are scored based on the BellagioSTAMP for sustainability assessment and measurement. Chapter 3.1.3: Data analysis has also explained how the scoring works. Table 12 below shows how these methods score on each principle. To understand the scoring, detailed explanation follows. This assessment is done using information provided through multiple channels such as reports, websites, interviews, etc., which are included in the References – BellagioSTAMP.

Method \ Principle	RLW	LWC	AM	AFW	WLW	OP	ALW	FC-LIRP
Guiding vision	2	2	2	2	2	2	2	2
Essential considerations	2	2	2	2	2	2	2	2
Adequate scope	2	2	2	2	3	2	1	1
Framework & indicators	3	3	3	3	3	3	2	3
Transparency	3	3	3	3	2	3	3	3
Effective communications	3	3	3	3	3	3	3	3
Broad participation	3	2	3	3	3	2	2	3
Continuity & capacity	3	3	2	3	3	2	2	1
Total	21	20	20	21	21	19	17	18

Table 12 BellagioSTAMP score of nine product S-LCA approaches.

For the *Real Living Wage (RLW)*, it receives 2 points for **guiding vision** for fulfilling two of three requirements. The Living Wage campaign, along with the development of the method, started in 2001 recognising the impact of low pay on the communities in the UK that had negatively affected sustainable development. It also recognises the need for better

well-being for the people who often work two or more jobs and do not have time to spend with their families. However, in the development of the method, the public is not involved. In terms of **essential considerations**, it scores 2 points for fulfilment of three out of four requirements. With many estimates provided up till now, the method has great understanding of the trends and the drivers of changes, as shown by its frequent update to changes such as inflation. It also recognises the risk of using the MIS basket for calculation due to price changes so it updates the price timely with changes to the method when necessary. The method also proves to be useful with a high number of workers benefitting from the calculation and employers who are accredited for paying their employees the fair remuneration rate. However, it does not consider socio-ecological system with sole focus on the wage of worker. It has a score of 2 for **adequate scope** principle, with an adequate time horizon but only applicable for the UK. It has provided fair remuneration estimates for London since 2005 and for the UK since 2011. Next, it scores a 3 for **framework & indicators** principle. For its conceptual framework, it fulfils all five levels of personal needs, with a standardised measurement method. For comparison, the estimates are compared with the UK's minimum wage and the national living wage set by the government. It is also a useful tool that has provided fair remuneration estimates for the UK and London since 2005. Next, for **transparency** principle, it gets a score of 3 for accessible data and results; clear explanation of choices, assumptions and uncertainties; disclosure of data sources and methodology; and disclosure of its partners. It also gets 3 points for the principle of **effective communications** as all elements are fulfilled. The language in its reports is clear and simple. The data is presented fairly, objectively, and in great detail, with the use of effective graphics and visual tools. For **broad participation**, it gets 3 points with strong leadership from the Living Wage Foundation and public participation through MIS research, which people fill out

surveys to provide data on their minimum acceptable standard of living in the UK. Lastly, for **continuity & capacity**, it gets 3 points, with repeated measurements since 2005 and constant update, review and revision of the method overseen by the Living Wage Foundation, in addition with continuous investment. The *Real Living Wage* gets a total score of 21.

In terms of **guiding vision**, the *Living Wage Calculator (LWC)* receives a score of 2, with understanding of sustainable development and well-being but without participation and social engagement during vision development. In its user's guide, it mentions that the method is a step up from poverty as measured by the poverty thresholds which is important for sustainable development as shown by the SDGs. The calculation is also centred on basic needs of a worker and his/her family, taking into account a worker's well-being. However, during the development process of the method, there is no sign of public participation or social engagement as it has been developed by the developers only. The next principle of **essential considerations**, the method gets a score of 2 for fulfilling three out of the four requirements. As the method has been in use for estimating fair remuneration in the US for many years and annually updated for any changes to the data, it has information on the trend as well as the drivers of change. For risks and uncertainties, the method acknowledges that for its current calculation, there are many components of fair remuneration that are not being considered (e.g., savings, leisure expenditures, emergency expenses) but it is open to partnership to explore this lacking. The high number of usages of the method within the US by companies proves that the method is useful for the estimation of fair remuneration. However, as this method only works with wage, it does not consider other systems such as the environment. In terms of **adequate scope** principle, the method's score is 2 as it has adequate time horizon but unsuitable geographical scope. It was created in 2003 and has

been in used ever since to estimate fair remuneration in the United States. However, as it has only been used in the US, it has been developed to cater to the local situation and needs of the people in the US, making it inapplicable to other countries and limiting its usage on a global scale. For the next principle of **framework & indicators**, it gets a score of 3 as it fulfils all three elements. It has a clear conceptual framework that identifies all core components regarding fair remuneration, fulfilling all five levels of the Maslow's hierarchy of needs, as shown in Table 5. Moreover, the measurement of this method is standardised with clear methodology and formula that is applicable for all locations in the US. Lastly, the estimates calculated are also compared to available benchmarks such as the minimum wage, poverty threshold and wages of other occupational groups. For **transparency**, the method gets a score of 3. The data, indicators and results are all available to the public on its website, providing estimates for all locations in the US, as well as its data sources and methodology. It also discloses the choices and assumptions used for the getting the results, while acknowledging the limitations of the method, for example, not considering some expenditure groups such as savings, leisure expenditures, emergency expenses, etc. Moreover, it also highlights some of its supporters on its websites such as Patagonia, Ikea, etc. The method scores a 3 in terms **of effective communications**, as the language is clear, information is presented in a fair and objective way, presentation of data and results are aided with many graphics such as tables, charts, etc., and the data is presented in great detail. For the principle of **broad participation**, it has a score of 2 as it only fulfils one of the key elements. It has a strong leadership, providing constant developing, monitoring and application of the method. Its leadership is also proven by the large media coverage with many articles published with movement regarding fair remuneration. However, it lacks public participation as there is no evidence shown that the public is involved in any process

of this method. Lastly, for the principle of **continuity & capacity**, it has a score of 3. The estimation is done annually, with continuous investment to gather the latest data and having the latest calculation. The method is also reviewed and revised whenever update is needed, which is also published on its website. Regarding responsiveness to change, as latest data is periodically gathered, the method is well adapted to changes to any factors, such as expenditures, taxes, etc. Overall, the *Living Wage Calculator* has a total score of 20.

For *Anker Methodology (AM)*, in terms of **guiding vision**, it receives a score of 2.

According to its mission published on its website, it says that its work is to inform and influence companies, empower workers, and shape public policy, thereby helping to enhance quality of life and sustainable livelihoods for workers and their families around the globe which is essential to sustainable development with worker's well-being in the centre. However, during the development process, it does not include participation from the public and social engagement. For **essential considerations**, the method receives a score of 2, with fulfilment for two out of four requirements. The method recognises the risks and uncertainties in its calculation. It uses the NFNH costs to food costs ratio to estimate the costs of other essential needs but also recognises the risk of this ratio to be insufficient for the calculation. It comes up with post checks on education and healthcare to make changes to the preliminary number if necessary. This method has proven to be a useful tool with application from various companies and recognition from many organisations such as the Sustainable Trade Initiative (IDH). However, in terms of understanding of current trends and drivers of change, the benchmark studies have been done only once for some countries giving little information on trends, although for other countries, the studies have been updated recognising the drivers of change. Moreover, it does not recognise the socio-ecological system with no evidence of consideration of the environment. The method has a

score of 2 for **adequate scope**, as it does not have an adequate time scope but a suitable geographical scope. As shown in Table 4, this method has been used for estimation of fair remuneration in 22 countries. However, due to the extensiveness of the full-fledged method, the calculation has only been done once, then updated for inflation and price changes after a few years, limiting its time horizon. In terms of **framework & indicators**, it gets 3 points. The conceptual framework is very clear to identify most of the individual needs, as shown in Table 5, fulfilling all levels mentioned by Maslow. The method is also standardised that it could be used in different countries. It also provides comparison with prevailing wages, using the wage ladder. In the wage ladder, there are seven reference points included: average wages by occupation and industry; minimum wages; national poverty line wage; World Bank international poverty line wages; collective bargaining agreement wages; trade union estimates of fair remuneration; fair remuneration estimates from NGOs and researchers; fair remuneration estimates of politicians and others. Next, in terms of **transparency**, it has a score of 3. Benchmark studies and reports are published on its website, along with its data sources and methodology. In its methodology explanation, it explains the choices and assumptions made clearly, as well as uncertainties with its process. In its reports and websites, it also mentions clients and partners that it has worked with. For the principle of **effective communications**, it gets a score of 3, as all four key elements are fulfilled, with clear and simple language, fair and objective presentation of information with the use of visual tools and graphics, and detailed data presentation such as fair remuneration estimates and data sources. In terms of **broad participation** principle, it has a strong leadership, leading by the Anker Research Institute and the Global Living Wage Coalition. In terms of the public participation, the process of the calculation involves local stakeholders such as trade unions, employer organisations and workers for consultation and gathering data. It results in

a score of 3 for fulfilment of all requirements. Lastly, it scores a 2 for the **continuity & capacity** principle as the method is periodically updated to respond to changes, with continuous investment, but the measurement is not repeated that often due to the extensiveness of the method as mentioned early. In total, the *Anker Methodology* gets a score of 20.

For *Asia Floor Wage (AFW)*, it receives 2 points for **guiding vision**. It recognises the current unsustainable economic model which gives power to the global buyers but fails to distribute the benefits in a fair way, especially to the workers. It understands that workers, garment workers in Asia specifically in this case, need a wage increase to be able to provide for themselves and their families' basic needs – their well-being. However, there is no sign of public participation and social engagement in the development of the method. For **essential considerations**, it gets 2 points for fulfilment of three out of four requirements. It understands the current trends with the estimates being updated occasionally, adapting to the drivers of change. It also recognises the uncertainties of implementing the method outside the studied region due to different assumptions, mentioning that the method cannot be simply applied in other regions with different conditions. It also proves to be a useful tool by gaining international recognition. However, it does not consider other socio-ecological system such as environmental impacts in the assessment. It gets a score of 2 for **adequate scope**, with an adequate time horizon, starting from 2009 with the first measurement with update after two to three years. However, the method is only applicable on a regional level as it says that the calculation is not easily applied for other regions due to differences in assumptions, such as food costs to non- food costs ratio, as the ratio for this region is 45% while for other regions it could be different. For **framework & indicators**, it has a score of 3 as all elements are satisfied. It has a standardised measurement method that

identifies core indicators regarding personal needs. The estimates are also compared with available benchmarks such as minimum wages, monthly wages and actual expenses. Next, for **transparency** and **effective communications**, it both gets a score of 3 as all elements are fulfilled. All relevant information about this method is available on its website. The methodology contains clear explanation of choices, assumptions and uncertainties in determining the results. The data sources used for calculation are also clearly explained. It also discloses partners that it has worked with. For communication, language is clear and simple; information is presented fairly, objectively and in great detail with the use of graphics; and data presentation is very detailed. Moreover, for **broad participation**, it has strong leadership from Asia Floor Wage Alliance who develops and monitors the method as well as pushing for the implementation of the fair remuneration estimates by working with various partners. It also involves the workers in the process by conducting surveys to update the ratio of food to non-food expenses with the latest situation, resulting in a score of 3 for this principle. Lastly, for **continuity & capacity**, by satisfying all elements, it gets a score of 3. The method is not usually updated but when the Asia Floor Wage Alliance realised the shift in the food to non-food cost ratio, the method has changed the ratio from 50% to 45%. Overall, the AFW gets 21 points.

For *WageIndicator Living Wage (WLW)*, it receives 2 points for **guiding vision**. It understands that paying fair remuneration is essential to sustainable development as it fulfils at least eight out of the 17 SDGs. It also focuses on well-being of worker with focus on ensuring wages are sufficient to meet the basic needs of workers and their families. However, similar to above methods, it does not include public participation and social engagement in the development phase. For **essential considerations**, it gets 2 points for fulfilment of three out of four requirements. With data collection and calculation process

that have been done for many years, it recognises the trends in wage as well as any drivers of changes to the calculation which leads to its frequent updates, sometimes quarterly. It also acknowledges its uncertainties with the set of assumptions that the calculation works with and has long-run research objective to provide more accurate estimations. The method is proven to be useful, earning recognition from the IDH. However, it does not take impacts on other systems such as the environment into account. It has a score of 3 for **adequate scope**, both time scope and geographical scope. The method has provided fair remuneration estimates for many years across 161 countries. With a standardised measurement method and a conceptual framework that fulfils five level of Maslow's hierarchy of needs, it gets a score of 3 for **framework & indicators**. The estimates are also compared with available benchmarks such as poverty line, minimum wages and actual wages. For **transparency**, it scores a 2 for clear explanation of choices, assumptions and uncertainties; disclosure of data sources and methodology; and disclosure of funding. However, the data and results are not all available. Only a limited number of estimates are available on its website. To get access to all the data, users are required to pay for a plan. In terms of **effective communications**, it scores a perfect 3 as the available data is presented fairly, objectively and in detail using simple language, with the help of visual tools and graphics. It also has a strong leadership with a dedicated team who oversee the method and make sure their clients can make use of the estimates as effective as possible. In addition with involvement from the public with its Cost-of-Living surveys, it gets 3 points for **broad participation**. It scores 3 points for the last principle of **continuity & capacity**, as the method is reviewed periodically with repeated measurement. To sum up, the *WageIndicator Living Wage* gets a score of 21.

For *Oiconomy Pricing (OP)*, it gets 2 points for **guiding vision**. The method has strong understanding of sustainable development with relevance to all the SDGs. The calculation of

fair remuneration as one aspect in the tool focuses on the well-being of workers and paying them the wage that is considered to be fair and above the international poverty line.

However, there is no evidence of public participation and social engagement in the development process. For **essential considerations**, it gets 2 points for fulfilment of two out of four requirements. This method is different from other methods in this research as the calculation of fair remuneration is only one aspect within the overall tool, which is a fully inclusive people, planet and prosperity assessment, recognising socio-ecological system and its links. It also acknowledges the limitations and documents them well in its papers, such as the exclusion of taxes by trusting the data from World Bank. However, this is a relatively new method with only one set of estimates provided so far, resulting in limited understanding of current trends and drivers of change. Moreover, the usefulness of the method is also unproven due to the limited application. For **adequate scope**, it has adequate geographical scope with the use of the moderate international poverty line of \$2 (2005 \$PPP) and GNI per capita data, making it applicable to all countries. However, it has a very short time horizon with only one data set calculated due to its rather new creation, resulting in 2 points for adequate scope. In terms of **framework & indicators**, it has a standardised measurement method with a different conceptual framework than the other methods, which makes use of the international poverty line. The international poverty line is created based on a sample of national poverty lines, which consider the core and basic personal needs, fulfilling the needs mentioned by Maslow in the process. For comparison, it uses the statutory gross minimum wage as the benchmark for the estimation. It scores 3 points for this principle. For the next 2 principles of **transparency** and **effective communication**, it scores a perfect 3 for satisfying all elements. Data, indicators, results, data sources, methodology and list of companies that this method has worked with are published and freely accessible to the public, along with

papers and information on its websites to provide explanation for the choices, assumptions and uncertainties of the method. The language used for communication is clear. Data and calculation are presented fairly, objectively and in great detail. This method also uses many tables, graphs, charts, etc. to present its results. All information is explained in detail on its website. For **broad participation**, it gets 2 points for fulfilment of one out of two requirements. It has strong leadership with the Oiconomy Pricing Foundation as the scientific organisation managing the methodology, with support from Utrecht University. However, there is no sign of public participation in the process with the use of available international poverty line constructed by the World Bank. For the last principle of **continuity & capacity**, it scores 2 points for fulfilling two of the four requirements. The method is still in the development phase with continuous investment to improve the method. The method is also revised with various pilot projects with companies. These projects give feedbacks to the developers who make changes and adapt the method accordingly when necessary. However, this is a new method with only one data set provided for fair remuneration as mentioned earlier so the measurement has not been repeated. Overall, *Oiconomy Pricing* gets a total of 19 points.

For *Alberta Living Wage (ALW)*, it gets 2 points for **guiding vision**. It understands that by paying fair remuneration, companies help in building a strong local economy and supporting sustainable and healthy communities. It also focuses on well-being of people with its calculation to reflect what people need to earn to cover the actual costs of living in their communities. However, there is no evidence of public participation and social engagement in the development of the tool. For **essential considerations**, it gets 2 points for fulfilment of one of the four requirements. It has proven to be a useful tool with several employers in Alberta getting certified for paying fair remuneration rate calculated by this

method. However, it does not take into account socio-ecological system other than people. It also does not report on the risks and uncertainties in its process. Moreover, as a new method, understanding of trends and drivers of change is low with limited historical data. It scores 1 point for the principle of **adequate scope** as this is a rather new method with short time horizon and the method is only applicable to the region of Alberta, Canada. For **framework & indicator**, it scores 2 points. It has a standardise measurement method and conceptual framework that considers all basic personal needs. However, it lacks comparison with any other benchmarks. For **transparency** and **effective communications**, it scores a perfect 3 points by satisfying all key elements. All information relevant to the method is presented in its reports and websites, including data, results, methodology, uncertainties, data sources and partners. The language used is also clear with the help of visual tools and graphics and data is presented fairly, objectively and in detail. Moreover, it has strong leadership which is continuously working on and advocating for the method so the estimates could be applied for the region. However, it shows no evidence of public participation in its process, getting 2 points for **broad participation**. For the last principle, **continuity & capacity**, it scores 2 points. As this is a new method, the methodology has not been revised yet and repeated measurement is limited. However, the method shows that it is responsive to change as the estimates are updated to take into account inflation, for example. Overall, the *Alberta Living Wage* gets 17 points.

For *FC-LIRP*, it receives 2 points for **guiding vision**. It has a clear vision of what sustainable development looks like with strong emphasis on poverty and equality, by providing calculation of a wage that allow a person or a family to live a decent standard of living. By doing so, it also improves their well-being from a farmer's perspective with a feeling of dignity, belonging, happiness, and what is needed to reach the core rights as

starting point. However, the developers work solely in the development process with no public participation or social engagement. In terms of **essential considerations**, it gets 2 points for fulfilling two out of four requirements. The developers are aware of the uncertainties from the answers given by the farmers and organise internal discussion within focus groups to come up with consensus in trying to avoid these uncertainties. The method is useful to Moyee itself with farmers getting paid according to the estimates that the method has provided in some regions. However, the method does not consider the overall socio-ecological system outside its workers and their wage. Moreover, as a new method, data is insufficient to have a good understanding of the trends and drivers of change. It gets 1 point for **adequate scope** principle, as the measurement has only been done once and it is only applicable to the farmers within Moyee's supply chain. In terms of **framework & indicators**, it has a clear conceptual framework with a set of basic needs communicated to the farmers and a standardised measurement methods used for calculation across five locations. It uses wages of other occupations in the region as the benchmark for its estimates, resulting in the overall score of 3. For the next 2 principles, **transparency** and **effective communications**, it gets a score of 3 points for fulfilling all elements. Moyee is transparent with all relevant information on the method and willing to share it with interested parties. Its reports use clear language with use of graphics and contain detailed and objective explanation of the data. For **broad participation**, the method has strong leadership with dedicated team tasked with developing and organising focus groups to gather data from the farmers. It also heavily involves the local stakeholders, the farmers in this case, with focus group sessions, resulting in a score of 3 for this principle. Lastly, for **continuity & capacity**, it gets 1 point as this is a new method that was first implemented in 2022, therefore there is no repeated measurement as well as review and revision. It would

require some time to see if the method is responsive to change. While Moyee has already paid or been working on plans to pay the calculated estimates in their regions of supply chain, now with Fairtrade starting to work on the regional measurement, the developers are thinking of adapt to Fairtrade's methodology, putting continuity of the *FC-LIRP* in question. Overall, the *FC-LIRP* gets 18 points.

The last method *Fair Wage Network Living Wage* was addressed in Chapter 4.1 Inventory using basic information gathered, but the developer of the method did not respond to questions for further analysis, so it is not possible to give it a score.

4.3 Selection of cases

After building the inventory, it is clear to see the initial differences and similarities of these methods. The next step of this study is to use the sampling strategy to narrow this list of approaches down for further assessment. The criteria are the applicability to the region of Mizan, Ethiopia and the availability of data for this research. Of all these approaches, only five approaches fulfil the first criterion and out of these five, only four approaches fulfil both criteria. Firstly, *Oiconomy Pricing* uses the World Bank's \$2 at 2005 US\$ PPP poverty line and it is applicable for 183 countries. One of the countries in this dataset is Ethiopia, explaining the applicability of *Oiconomy Pricing* for the selection. The method is also free to use with publication of its website. Secondly, *Anker Methodology* has also been done for the Ziway region in Ethiopia and the report is published on GLWC website, making it available for comparison. Thirdly, *WageIndicator* has an extensive network of data collection in 161 countries and 2327 regions. One of the regions in their database is the Southwest Ethiopia Peoples' region in Ethiopia and Mizan is the largest town in that region. The data set for this region is not freely available on their website as *WageIndicator* only makes only a very

limited number of regions' data available for free. However, for this research, a request has been sent to ask for permission from the team of WageIndicator and they are willing to provide a dataset for Mizan. Lastly, *FC-LIRP* conducted one of their studies in Mizan and provides this study with the data and report. Fair Wage Network is among the five methods that meets the first criterion, but Fair Wage Network team is unable to be contacted for the dataset, although it has the most extensive network out of all the approaches as it has estimations for 200 countries.

Using the sampling strategy, the original list of nine methods is narrowed down to four methods for further assessment: *Oiconomy Pricing*, *Anker Methodology*, *WageIndicator Living Wage*, and *FC-LIRP*.

4.4 Comparative application analysis

To conduct comparative application analysis for this research, the estimates as well as the calculations of four methods are gathered. These are then compared to the benchmark case study of the farmers in Mizan, Ethiopia. Table 12 below shows the calculations of each method and the case in reality in Mizan. As the wage data is in different currencies, mostly in the local currency Ethiopian Birr (Br), the exchange rate from the World Bank is used to convert Br or US\$ to € ($\text{€1} = \text{Br } 49,15$ and $\text{€1} = \text{\$0,95}$). This exchange rate¹ is the average of the rates in 2022. Information on the reality in Mizan has been collected through the *Oiconomy Pricing* project at Moyee Coffee. Other information on the calculation of each method has been collected via reports and interviews with a few of the developers of these methods, which are included in the References – Dataset.

¹ Exchange rate from <https://data.worldbank.org/indicator/PA.NUS.FCRF>

Method Components	Reality	AM - Ziway region	WLW - Typical family	OP	FC-LIRP
Weeks per year	52	52	52	49	52
Days per week	6	6	6	5	5
Hours per day	6	8	8	8	8
Holidays / year	0	0	0	12	0
Hours per year	1872	2496	2496	1864	2080
Data year	2022	2015	2022	2016	2022
Family size	x	5	6	4	5,5
Workers per family (1)	x	1,65	1,70	2,00	x
Food expenditure (2)	x	Br2.014,00	Br9.284,00	x	Br5.120,00
Housing expenditure (3)	x	Br1.077,00	Br4.915,00	x	Br967,00
Water (4)	x	x	Br320,00	x	x
Clothing (5)	x	x	Br1.346,00	x	x
Healthcare (6)	x	(x)	Br1.518,00	x	Br2.000,00
Transport (7)	x	(x)	Br964,00	x	x
Phone (8)	x	x	Br139,00	x	x
Education for children (9)	x	(x)	Br717,00	x	Br2.334,00
Non-food and non-housing/ food ratio	x	0,43	x	x	x
Non-food and non-housing costs (NFNH) (10)	x	Br978,00	x	x	x
Provision for unforeseen events (11)	x	Br203,00	Br960,15	x	Br917,00
Monthly living expenses per family (12)	x	Br4.272,00	Br20.163,15	x	Br11.338,00
Taxes & mandatory deductions (13)	x	Br784,00	Br3.947,00	x	x
\$2,00 a day/ year (2005 US\$ PPP)	x	x	x	\$1.547,00	x
Correction	x	Updated for inflation	x	Updated with new proposed moderate international poverty line	x
Net hourly wage (14)	€ 0,68	€ 0,77	€ 1,20	x	€ 1,82
Gross hourly wage (15)	€ 0,68	€ 1,04	€ 1,58	€ 1,00	x
Net monthly income (16)	€ 105,80	€ 159,92	€ 248,79	x	€ 316,26
Gross monthly income (17)	€ 105,80	€ 215,81	€ 329,10	€ 155,28	x
Net yearly income (18)	€ 1.269,61	€ 1.919,07	€ 2.985,54	x	€ 3.795,16
Gross yearly income (19)	€ 1.269,61	€ 2.589,76	€ 3.949,22	€ 1.863,31	x

Table 13 Calculation of fair remuneration of four product S-LCA approaches.

(x) – components that are post checked through local data collection

For the benchmark case study of the coffee farmers in Mizan, they are paid by production and not by hours. Throughout the year, the farmers work 6 days a week for 52 weeks and about 6 hours a day, resulting in a total of 1872 working hours a year. For the period from January to October, the farmers work mainly on weeding and maintaining of the

coffee plots. They are paid Br 50 for every 500 m² of land, earning about Br 150 per day and Br 25 per hour. For the period from October to January, the harvesting season, the farmers are paid by the amount of coffee cherries that they can pick. They are paid Br 10 per kilograms of cherries picked and the average harvested amount is about 5 kilograms per hour, earning on average Br 50 per hour. Hence, the farmers in Mizan earn Br 25 per hour for 8 months and Br 50 per hour for 4 months, making the earning on average for the whole year about Br 33,33 (€0,68) per hour. Taking into account the working hours, the farmers in Mizan earn €1.269,61 per year and €105,80 per month. In terms of tax, the farmers do not pay taxes for the wage earned and the employer has not provided reliable answer on the taxes paid on behalf of the workers. In Ethiopia, it is common practice that the people have many ways to avoid paying taxes, especially people earning low wages like farmers. Hence, the number is assumed to be in both net and gross terms.

A full-fledged *Anker Methodology* has been done for the flower farmers in the Ziway region, Ethiopia in 2015 and updated in 2022. For this case, the calculation is done on basis of 2.496-h working year (8 hours per day and 6 days per week for 52 weeks). The family size is 5 (2 adults and 3 children) and the number of workers per family is 1,65. The *Anker Methodology* uses the basket of needs approach, so data on each component must be gathered for the calculation. The numbers for each component in the calculation are the data from the original study in 2015, while monthly income and yearly income are updated to provide the data for 2022, taking into account inflation over the years. The first step of the method is to determine the **monthly living expenses per family** (12), which consists of **food** (2), **housing** (3), **NFNH costs** (10), and **provision for unforeseen events** (11). To calculate **food expenditure** (2), this method has developed a low-cost and nutritious model diet which adheres to the standards of the WHO for nutritional and caloric needs while also being

consistent with local food preferences in the region. This results in a model diet of 2.279 calories per person per day, assuming that the flower farmers have vigorous physical activity while other members of the family have moderate physical activity. This model diet consists of a wide variety of food options such as meat, milk, fish, eggs, vegetables, etc. Then, the cost of the model diet has been estimated by collecting local food prices using price survey at all markets that have been pointed out by the workers. Having gathered all information, the **food expenditure** (2) has been estimated to be Br 2.014 per month for a family of 5. To estimate **housing expenditure** (3), several houses have been visited and several workers as well as landlords have been interviewed, reviewed using secondary data on minimum standards of low-cost houses that are consistent with international and national standards. After determining the standard for basic acceptable housing and the rent for housing, the **housing expenditure** (3) has been determined to be Br 1.077 per month for a family of 5, including utilities and other housing costs. The next component of the monthly expenses is the **NFNH costs** (10), which has been determined by the ratio of NFNH expenditure to food expenditure obtained from the household consumption expenditure survey (HCES), with value of 0.47. However, some adjustments have been done to the ratio to exclude items that are unnecessary for basic quality of life such as tobacco, narcotics, etc, resulting in the final ratio of 0.43. With this ratio, the **NFNH costs** (10) have been determined to Br 978 per month for a family of 5. This **NFNH costs** (10) value has been post checked by prevailing costs of healthcare, education and transport, resulting in an increase of Br 109 from the preliminary NFNH. This post checks have been done by gathering information from interviews with respective correspondents. For the final component of the monthly expenses, a 5% margin has been included for **provision for unforeseen events** (11), as stated in *Anker Methodology* and has also been used in other countries. These events could be due

to increases in food prices. The final step is to determine the **net monthly income** (16) and the **gross monthly income** (17). The **net monthly income** (16) is calculated by dividing the **monthly living expenses per family** (12) by the **workers per family** (1) of 1,65. It is then added with the **taxes & mandatory deductions** (13) to get to the **gross monthly income** (17). For mandatory deductions, the workers who earn the calculated living wage by the *Anker Methodology* are subjected to a 30% marginal tax rate and 7% social security contribution, resulting in a amount of Br 784. As the numbers provided above were from the original benchmark study in 2015, these numbers have been updated in the update report of 2022. This results in the **net monthly income** (16) of €159,92 and the **gross monthly income** (17) of €215,81.

For *WageIndicator Living Wage* method, three different fair remuneration wages have been calculated: individual, standard family (2 adults + 2 children) and typical family (2 adults + national fertility rate), with lowest and highest value. For this analysis, the wage for a typical family with the lowest value has been chosen, in the Southern Nations, Nationalities and Peoples region, where Mizan is located. The lowest value represents the values of components at 25th percentile, which is representative of a cost optimising family. For this method, the total working hours per year are 2.496 hours, similar to the *Anker Methodology*. The national fertility rate is determined to be 4, resulting in a family size of 6. The number of workers per family is 1,70. This method also uses the basket of needs approach, but with more components than the Anker Methodology as data for each component is gathered individually. To determine the **monthly living expenses per family** (12), data on these components are collected: **food** (2), **housing** (3), **water** (4), **clothing** (5), **healthcare** (6), **transport** (7), **phone** (8), **education for children** (9), and **provision for unforeseen events** (11). These data are collected by the Cost-of-Living survey that the

WageIndicator has implemented worldwide, including web survey, app, webshops, in print and from local markets. They are complemented with data from external sources: World Food Programme for data on food prices, Numbeo data for prices regarding housing as well as some food data, and data from national statistical agencies for data regarding health cost, phone cost and education cost. For **food expenditure** (2), the method calculates costs using two data sources: Cost-of-Living survey and the UN FAO food balance sheet, reflecting food preferences in a country. It has developed a model diet of 2.100 calories per person per day. All these data result in the **food expenditure** (2) of Br 9.284 for a family of 6. For **housing expenditure** (3), data from the Cost-of-Living survey is supported with external data from Numbeo, resulting in the value of Br 4,915. For the rest of the components, costs are taken from the Cost-of-Living survey as followed: **water** (4) – Br 320; **clothing** (5) – Br 1.346; **healthcare** (6) – Br 1.518; **transport** (7) – Br 964; **phone** (8) – Br 139; and **education for children** (9) – Br 717. In terms of **provision for unforeseen events** (11), this method applies a 5% margin. The formula to calculate **monthly living expenses per family** (12) is as follow: $(12) = (2) + (3) + (4) + (5) + (6) + (7) + (8) + (9) + (11)$, resulting in a value of Br 20.163,15. The **net monthly income** (16) is then calculated by dividing the **monthly living expenses per family** (12) with the number of **workers per family** (1) of 1,70, resulting in a value of €248,79. The worker who earns this wage is required to pay **taxes & mandatory deductions** (13) of Br 3.947, resulting in a **gross monthly income** (17) of €329,10.

For *Oiconomy Pricing*, it moves away from the basket of needs approach, making use of the available **moderate international poverty line of \$2 (2005 US\$ PPP) a day** instead. In terms of working hours, this method follows the ILO conventions which agree on a standard work week of 40h, a maximum of 49 work weeks, and a standard workday of 8h. The average number of public holidays determined is 12 days. Hence, this results in a 1864h

work year. For family size, this method has determined that a family size of 4, with 2 births per woman, is a sustainable and reasonable number. To determine labour participation, there are two components that this method looks at. The first component is taking into account the life expectancy (LE) and the working years (WY). In the benchmark group of top 20% performing countries in Sustainable Society Index – Human Development, the average LE is 78,34 years and the average number of WY is 46,21 years, meaning that over one's working life, a person must earn $78,34/46,21 = 1,70$ times one's income. The second component is that one of parents can only gain a half income in half of one's working years, meaning that one person has to earn 1,25 times one's income. The two components combined result in $1,70 \times 1,25 = 2,12$ times one's income. As Ethiopia does not reach the relative fair minimum wage, fair remuneration for the country is set at cut-off point of the absolute fair minimum wage. Applying the moderate international poverty line, formula for fair remuneration is as followed: $365 \times \$2 \times 2,12 = \1547 (2005 US\$ PPP) per year. As the data is outdated and the mentioned moderate international poverty line is not being used by the World Bank anymore, this research proposes a correction to the number to convert it to 2022 number so that it is comparable to other methods. When the \$2 moderate poverty line was in use, the international poverty line, so-called extreme poverty line, was at \$1,25, meaning that the moderate poverty line was $2/1,25 = 1,6$ times higher than the poverty line. Applying such assumption, with the current poverty line set at \$2,15 2022 US\$ PPP (World Bank Group, 2022), the new proposed moderate poverty line is $2,15 \times 1,6 = \$3,44$ 2022 US\$ PPP. Applying the 2022 conversion rate² for PPP from the Organisation of Economic Development (OECD) and Oiconomy Pricing's formula, the **gross yearly income** (19) is set at $365 \times \$3,44 \times 2,12 \times 0,7 = €1.863,31$ per year, and the **gross monthly income** (17) is €155,28.

² PPP conversion rate from <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

The *FC-LIRP* uses focus group for the calculation of fair remuneration. This method applies the standard of work week of 40h in 52 weeks and an 8h workday, resulting in a total working hour of 2080-h per year. Before the FC-LIRP sessions, desk research has determined that the family size in Mizan is 5,5. However, the number of workers per family is not specified. The determination of a farmer's income consists of a two-part assignment, with three focus groups. The first part of the assignment is to do brain exercises with the farmers, making them think of their living costs to have a decent standard of living. The costs are then calculated as the average of the numbers of the three groups. The results are as followed: **food** (2) – Br 5.120; **housing** (3) – Br 967; **healthcare** (6) – Br 2.000; **education for children** (9) – Br 2.334; and **provision for unforeseen events** (11) – Br 917. The **monthly living expenses per family** (12) is then calculated using the formula: $(12) = (2) + (3) + (6) + (9) + (11)$, resulting in a value of Br 11.338. However, these numbers are only used as a reference for the farmers in determining their salary, which is done in part 2. The farmers are asked individually to write down what they think they should earn, then coming to a group consensus. This part is aided by the list of wages of other occupations, such as primary school teacher, nurse, doctor, police officer, etc. After part 2, the **net monthly income** (16) determined is €316,26. All answers are discussed among the focus groups to come up with a consensus, including the final calculation of monthly income.

Chapter 5: Discussion

In this section, the implications of this research are discussed. This is followed by a section a section containing the most important limitations of the research accompanied by suggestions for future research.

5.1. Implications

The result from the comparative application analysis has shown that all four methods chosen for further assessment are able to provide estimates that are higher than the wage that is currently being paid to the farmers in Mizan, Ethiopia. The *FC-LIRP* provides the highest estimate, the *WageIndicator Living Wage* provides the second highest estimate, the *Anker Methodology* provides the third highest estimate, while the *Oiconomy Pricing* provides the lowest estimate. These difference in calculation is explained by the component choices and data sources presented in Chapter 4: Result. The summary of the results of the four methods is presented in Table 14 below:

	AM	WLW	OP	FC-LIRP
Needs components included	15	14	7	6
Data sources	Ratio from previous household expenditure survey	Cost-of-Living survey	International Poverty Line	Focus group
Reference family size	5	6	4	5,5
Net monthly income	€ 159,92	€ 248,79	X	€ 316,26
Gross monthly income	€ 215,81	€ 329,10	€ 155,28	X

Table 14 Summary of results of four product S-LCA approaches.

It is important to note that *FC-LIRP* is an outlier in this analysis. It has the highest estimate with the lowest number of needs components included in the calculation. This is explained by the use of focus group as the data source. As this method allows the farmers to ultimately decide the amount of wage that they wish to be paid, it is reasonable that the number collected is the highest among these methods. However, this also put questions on the validity of the method as the answers given by the farmers are not checked against any benchmarks or available data on what level the wage should be. This is also understandable from the *FC-LIRP's* perspective as there is no consensus on a universal method to estimate fair remuneration that it can use. Its focus is to find a wage rate that allows the farmers to cover their basic but decent living standard but also that the farmers are happy with.

For the other three methods, it is easier to understand the difference in estimates calculated. The two methods with the highest needs components included, *Anker Methodology* and *WageIndicator Living Wage*, provide the two highest estimates, compared to the calculation from *Oiconomy Pricing*. This is due to the fact that they cover more needs that are required by workers to have a decent standard of living, on theory. The difference in the estimates is also due to the difference in data sources used for these methods. The *Oiconomy Pricing* makes use of macro data such as the available international poverty line, making it impossible to appropriately represent specific needs of workers. The use of macro data helps increase the applicability of the method, as the information on international poverty line is available and periodically updated by the World Bank, making it applicable for all locations. However, in this research's the comparative application analysis, a new proposed moderate international poverty line has been proposed because the chosen line by this method is not used by the World Bank anymore. This limits the validity of the

method in this comparative application analysis as the proposed poverty line is not proven to be usable which is merely based on assumptions from original work of the developers. Hence, although the *Oiconomy Pricing* is applicable in all countries, the applicability and validity of the method depends on frequent update of the World Bank's poverty line. For the other two methods, they make use of micro data that is specific to workers' needs. The *Anker Methodology* applies the ratio of NFNH costs to food costs derived from available previously conducted household expenditure survey by other parties, while the *WageIndicator Living Wage* collects its own data through its Cost-of-Living survey. The work from *WageIndicator Living Wage* is more extensive than others which provide estimates for all components considered individually. This extensiveness in data collection of the components also explains the higher fair remuneration estimate for *WageIndicator Living Wage*.

Moreover, another factor that explains that difference in the final number calculated by the methods is that reference family size, as shown in Table 14. The lowest estimate from the *Oiconomy Pricing* is due to the smallest family size considered, meaning the income calculated is to cover the needs of less people in the family. The *WageIndicator Living Wage*, out of the three methods except *FC-LIRP*, provides the highest estimate with the highest family size considered.

Besides the implication from the comparative application analysis, this research has provided addition knowledge to the discussion on fair remuneration assessment. This is shown by the results of the assessments of all nine methods in Chapter 4.1: Inventory and Chapter 4.2: BellagioSTAMP. The UNEP has placed a strong emphasis on the topic of fair remuneration by including fair salary as one of the aspects in the S-LCA guidelines and the methodological sheets. The S-LCA community has also recognised the importance of this

topic with an increasing number of product S-LCA approaches on fair remuneration, in an attempt to calculate or estimate the level of wage that is considered to be fair for the workers. Nine methods, with fair salary as the centre of focus, have been included in this research, with no consensus on a universal methodology for calculation as mentioned in the introduction as knowledge gap. Although there are different terminologies used to refer to as fair remuneration, the most used term is living wage, which is similar to the term used by the UNEP. By the definition of the UNEP, a living wage is a wage that enables worker and his/her family to meet their needs. Eight out of nine methods in this research have taken on the bucket of needs approach, while the *Oiconomy Pricing* is the only method that picks another approach to use the international moderate poverty line constructed by the World Bank.

In order to assess the approaches taken by the methods, on the component they choose for the calculation specifically, the Maslow's hierarchy of needs is used as a reference or can also be referred to as a guideline for assessment on basic needs. Generally, the methods are able to cover the five levels of needs which by the definition of the UNEP, the estimates provided by these methods can be considered to be, on theory, a living wage, or fair remuneration as the needs of worker and his/her family are fulfilled. However, this research shows another difference of the nine methods, apart from the above-mentioned difference in terminology, in the components they include for calculation. Although the five levels are fulfilled similarly, within the levels, the individual components are different for the methods. There are some similarities in choosing the components. As shown in Chapter 4: Result, there are three components that all methods include in their calculation: food, housing, and healthcare. Moreover, three components are included in eight of nine methods: education for children, transportation and utilities & fuels. For education for

children, the method that excludes this component is the *Real Living Wage*. This method is used to provide fair remuneration estimates for the UK, where education for children is free (Government Digital Service, 2016). This explains the omission of this component in the calculation. For transportation, the *FC-LIRP* excludes this component due to the situation of workers in the locations that the method has conducted studies in. In the region of Mizan, for example, the farmers often stay on the farms and travel to work or any places on foot. Hence, transportation is not considered a basic need for these farmers. And for utilities & fuel, this component might or might not be included in calculation of *FC-LIRP*. This method lets the farmers decide on the final number as fair remuneration, with the first part of providing the farmers with information on common basic needs working as only a reference. Similarly, the five components mentioned above, apart from utilities & fuels, are also mentioned in the definition of living wage by the UNEP regarding as basic needs. It shows that these are five basic needs that are indispensable and must be included in any methods or application of fair remuneration. A component that most of the methods exclude is alcohol. However, albeit having it as a component, the *Anker Methodology* and the *Real Living Wage* only consider moderate consumption of alcohol and acknowledge that this component can be excluded from the calculation like some components in the same category such as tobacco, narcotic, etc. For other components, the result varies, leaving the choice to the methods depending on the situation of the location in assessment.

After looking at the justification and rationale in choosing the components, these methods are assessed as an overall sustainability measurement or assessment, using the BellagioSTAMP. Based on the scoring system, the *Real Living Wage*, *Asia Floor Wage* and *WageIndicator Living Wage* have the highest score with 21 points out of a maximum score of 24 points, and the *Alberta Living Wage* receives the lowest score with 17 points. There are

some key takeaways from the score. For similarities, all nine methods score the same number of points for guiding vision (2 points), essential considerations (2 points), and effective communication (3 points). In terms of communication, all methods receive perfect score due to the delivery and presentation of information. All information is presented fairly and objectively, with the help of clear language, graphics and visual tools. For guiding vision, all methods miss out on the requirement of public participation and social engagement in the development process. This is an important aspect of sustainability measurement or assessment as it helps ensuring the final assessment is relevant to the people that whose progress the method assess who, in this research, are the workers (Pintér et al., 2012). For essential consideration, most methods miss out on the requirement of recognising socio-ecological system and its links which is understandable in this research as these methods focus on the people, on fair remuneration specifically. The adequate scope principle gives the most contrasting outcome with scores range from 1 to 3. As a sustainability measurement, it is important that a method can be applied worldwide, preferably. However, this research acknowledges that some methods, such as *Real Living Wage*, *Living Wage Calculator*, *Asia Floor Wage*, *Alberta Living Wage*, and *FC-LIRP*, are developed to solve wage problem in a specific location or region, explaining its limited geographical scope. A few numbers of methods, like *Oiconomy Pricing*, *Alberta Living Wage* and *FC-LIRP*, has just been developed recently, limiting their time horizon. The last key point is about the broad participation principle. It has a similar requirement to the guiding vision on public participation which, in this case, is the involvement of the public in the implementation and calculation process of the method. As the calculation is used to estimate remuneration that ensures the well-being of workers, it is essential to include the subject of assessment in the whole process.

5.2 Limitations

One of the limitations of this research is the small sample size of only four methods included for the comparative application analysis. The comparative application analysis gives more detail on the application of the methods by taking a deeper look into the calculation of these methods. With the Mizan case study as a comparison, it gives a chance to compare the estimates provided by the methods with the reality. This sheds light on the applicability as well as the validity of the method. However, due to not meeting the criteria for the selection of case mentioned in Chapter 4.3: Selection of cases, five methods have to be excluded. This difference in applicability prevents more in-depth comparative application analysis for all nine methods as some of the methods are not comparable to the situation in a specific location, for example, Mizan in this research.

Another limitation of this research is about data. This research relies on the information provided by the developers. As information are taken from published reports, websites of the developers and interviews with them, this research relies on the credibility of the data gathered, which are susceptible to bias or being invalid. The data on wage of the workers in Mizan is gathered through the Oiconomy Pricing project. The farmers have been asked on the wage that they are being paid. This creates a dependency on the credibility of answers given by the farmers. The information is also difficult to be checked with the employers, who could give different number for various reasons. For the case in Mizan, there is no record keeping of wage which makes it impossible to verify information. Another limitation on data is that it is often inaccessible. For the case of Fair Wage Network Living Wage, the developer has not responded for further questions on the method and data sets,

despite being one with a wide network of countries that this method has studied and provided estimates for.

5.3 Future development

In terms of further development and future research, this research could be extended to include the perspectives of the farmers in Mizan or workers in other locations, to further assess the applicability and validity of the methods. All information in this research is provided by the developers of these methods via various channels, but information from the workers on these methods is lacking. The future research could add another dimension to the analysis of methods with input from the farmers, or any other subjects of assessment. Having the workers to assess these methods could verify the validity of data used in the methods to see whether it reflects the true nature of the situation. As most methods provide calculation on the basis of basket of needs, this basket could also be verified to see whether the appointed components are applicable to the lifestyle or standard of living of these farmers.

Chapter 6: Conclusion

This research has been launched to bridge the knowledge and research gap regarding product S-LCA approaches on fair remuneration. There is no consensus on a universal methodology on how to calculate fair remuneration. Hence, the following research question is set out to provide more information on this topic and bridge the knowledge gap:

How the similarities and differences between product social life-cycle assessment approaches on fair remuneration affect their applicability and validity?

To answer this question, the following sub-questions need to be answered:

- 1. What is the justification and rationale behind the calculation of fair remuneration?*
- 2. What type of data is collected for the method?*
- 3. What are the implications on applicability and validity of the method when it is applied to the case study of workers in the coffee supply chain in Mizan, Ethiopia?*

In order to answer the research question as well as the sub-questions, a research design has been set up with the following steps: (1) literature review; (2) inventory; (3) data analysis; (4) selection of cases; (5) comparative application analysis; (6) discussion; and (7) conclusion and recommendation. The first step of literature review has given the basic understanding on the concept and discussion of fair remuneration. It has also given the introduction to nine product S-LCA approaches on fair remuneration that are currently being used, providing basis for the second step of building an inventory. The inventory consists of

basic information of the nine methods found in the first step. These methods have then been analysed by the Maslow's hierarchy of needs and the BellagioSTAMP found via the literature review as the theoretical background of this research. These nine methods have been reduced to four methods by a set of criteria. Then, these four methods have been compared by comparative application analysis in step (5) with the wage situation in reality in Mizan. The implications, as well as limitations and future development, have been provided in the next step of discussion, based on the results of this research. Finally, this research is concluded with answers to the research questions in Chapter 1: Introduction and recommendations, as followed.

For the justification and rationale behind the calculation of fair remuneration, most of the methods uses the basket of needs approach, as defined by the UNEP. The method that uses a different approach is the *Oiconomy Pricing*, which uses the moderate international poverty line. All methods have full focus on determining fair remuneration rates that allow the workers and their families to enjoy a basic but decent living standards, earning enough to meet their needs. For the basket of needs approach, all methods agree on including five main components: food, housing, healthcare, transportation, and education for children. For other components, these methods differ with choices depending on the situation in the locations that they conduct study in. As workers in different parts of the world have different types of expenditure and different amount of money they spend on these expenditures. For *Oiconomy Pricing*, it uses the moderate international poverty to determine fair remuneration for workers, as a step up from the international poverty line, which is often referred to as the extreme poverty line. This method determines that the international poverty line is not sufficient to provide workers with a fair rate as it is the bare minimum and suggests that the moderate international poverty line is a better line in doing

so. For standards on working hours, these methods agree on applying the ILO standards on working time, with a limit on normal hours of 8 per day and 48 hours per week. However, the total number of working hours differ for these methods based on the working condition in their studied location. For family size and number of earners per family, these methods differ. In terms of family size, the *Asia Floor Wage* and *Oiconomy Pricing* agree on a family size of two adults + two children. The *Real Living Wage*, *Living Wage Calculator*, *WageIndicator Living Wage*, and *Alberta Living Wage* provide estimates for multiple family sizes. The remaining three methods, *Anker Methodology*, *Fair Wage Network Living Wage*, and *FC-LIRP*, the calculation is based on the local average household size, which is often to be two adults + the local fertility rate. For the number of workers per family, all the methods agree it to be between 1-2, with some methods provide estimates for predetermined one or two workers, while the rest of the methods, such as *Anker Methodology*, *Fair Wage Network Living Wage*, and *WageIndicator Living Wage*, do research on local employment rates to determine the number of workers per family. Moreover, these methods also show different geography usage. *Alberta Living Wage* and *FC-LIRP* provide estimates for the local communities and *Anker Methodology* provides estimates for the whole region. *Real Living Wage*, *Fair Wage Network Living Wage* and *WageIndicator Living Wage* provide both regional and national estimates. *Oiconomy Pricing* is only able to provide national estimates. For *Asia Floor Wage*, it provides estimates for individual countries and also cross-country estimates for a region. The last method, *Living Wage Calculator*, provides estimates at county, metropolitan area, state, regional and national level.

For the type of data collected for the method, there are two main approaches and sources of data: micro data and macro data, collected through primary or secondary sources. Due to the differences in component choices, while other methods use micro data

for their data collection, *Oiconomy Pricing* uses macro data of the moderate international poverty line constructed by the World Bank. In terms of micro data, which is specific to the needs of the workers in a location, the rest of the methods except from *Oiconomy Pricing* also differ regarding how these data are collected. *Fair Wage Network Living Wage*, *WageIndicator Living Wage* and *FC-LIRP* choose to collect their own data through expenditure survey, Cost-of-Living survey and focus group, respectively. *Real Living Wage*, *Living Wage Calculator* and *Alberta Living Wage* make use of secondary data that have been collected by other parties on the components that they include in their calculation. Finally, *Anker Methodology* and *Asia Floor Wage* build on their own data collection and supplement their calculation with secondary data from previous works of other parties.

The original nine methods have then been narrowed down to four methods to provide answer for sub question (3). This selection of cases gives the first implication on the applicability and validity of the methods that not all methods are applicable to provide estimates for Mizan, Ethiopia. Only *Anker Methodology*, *WageIndicator Living Wage*, *Oiconomy Pricing* and *FC-LIRP* are applicable to the case study of Mizan, meaning only estimates provided by those are comparable to the situation in Mizan and potentially able to set the fair remuneration rate for the region. The rest of the methods, except *Fair Wage Network Living Wage* which developer has not responded to dataset request, are not applicable due to various reasons that will be explained in the answer to the main research question in the following paragraph. In terms of component choices, the four selected methods fulfil all level of needs in the Maslow's hierarchy of needs and the basic needs mentioned by the UNEP on the definition fair salary and living wage. Hence, it means that on theory, the estimates provided by these methods cover the basic needs required by workers to have a decent standard of living. Moreover, the estimates are also higher than the wage

rate that the farmers in Mizan are currently receive, which can potentially set the fair remuneration rate for this region. However, the result from the comparative application analysis raises question on the validity of *Oiconomy Pricing* and *FC-LIRP*. The *FC-LIRP*, which has the highest estimate, allows the farmers to provide final answer for the wage that they seem to be fair. Hence, the needs components included in the calculation can only be assumed that the answer given by the farmers cover these needs and that they are aware of the basic needs required by them. If this method is applied without being checked with other sources of data, it would reduce the validity of data given by the farmers. For the *Oiconomy Pricing*, the use of international poverty line creates a dependency on the data from the World Bank, as shown in this research that a new line had to be proposed since the original poverty line is no longer in use. This method requires constant checking with the poverty line update from the World Bank to maintain its applicability and validity.

The similarities and differences between methods shown above have an impact on applicability and validity of these methods, as shown by this research. In particular, the choice of components and data used affect how applicable and valid the method is to calculate fair remuneration rate. As there are two main approaches shown, basket of needs approach and international poverty line approach, the choice on which approach has different implications. The international poverty line makes the application of the method based on this line to be easier and suitable for all locations. However, it is unknown whether this line covers all basic needs of workers, depending on how individual national poverty lines are constructed. With the basket of needs approach, based on definition from the UNEP, there are some basic needs that workers require to have a basic but decent lifestyle, so methods that consider these needs are useful to set the fair remuneration rate. However, this approach requires more work from the user to collect data on different components,

and even more extensive data collection is required to collect primary data. In terms of primary data collection, the reliability of the sources must be verified to ensure the validity of the method. As different methods have different choices of the component, some methods choose the components that are suitable for their regions of study, making it inapplicable to apply them to other regions where the basket of needs is different. Hence, the geography choice of the method also has an impact on its applicability.

The results from this research provide some recommendations for various actor types. As further shown in this research, which has been mentioned as the knowledge gap in Chapter 1: Introduction, there is no consensus on a universal methodology to calculate fair remuneration. Although it is not necessary to have just one method, it is essential to develop a guideline to what must be included for the calculation and how the calculation must be done. Developers must work together on setting a general guideline with the help of international governing bodies such as the UNEP, UN, etc. to publish this guideline. This gives more context to the existing S-LCA guidelines and the methodological sheets, for the topic of fair salary especially, instead of just placing an emphasis on this topic. It creates less confusion in the application of these methods for interested parties. The Maslow's hierarchy of needs provides the basis for the forming of this guideline, with the set of components that could be included in the calculation. These components should be studied further to see whether it is applicable and relevant to include in the guideline. This requires collaboration between developers, governing bodies, and scientific organisations to conduct research on individual needs components to product a basket of needs that is representative for workers around the world. With a universal agreed upon guidelines, it leaves the data collection for respective components for interested organisations to work on.

On the assessment of sustainability measure and assessment, provided by the BellagioSTAMP, one key takeaway that all studied methods are missing is the public participation and social engagement in the development process. Hence, it is important for the developers of these methods to include the perspective of the public in forming the above-mentioned guideline or developing any other methods. This ensures that the final assessment or calculation is applicable and relevant to the subject of the assessment.

For companies that want to apply these nine methods or use the estimates provided by them, it is essential to consider the following factors that have been studied in this research: choice of components, data manipulation factor and data sources. All of them need to be studied to see whether they are applicable to the region of the company or the situation of workers in the company. In terms of data, the data sources must be checked to see whether they are accessible and available. Especially for primary data, its availability is essential but also company's capacity in data collection. For small companies, it is costly and time consuming to collect primary data of their workers.

For Moyee, the result has shown that the calculation using *FC-LIRP* gives the highest rate of fair remuneration out of the four methods chosen for the comparative application analysis, and importantly higher than the current wage rate of the farmers in Mizan. It is good to pay the farmers such a high rate, provided that they work with high productivity as they have stated, to enable the farmers to have a better livelihood for themselves and their families. However, this would incur more production costs for Moyee that it has to find the balance between paying the *FC-LIRP* rates and profit. It is important to note that currently only the farmers are being paid the *FC-LIRP* rates, but there are other workers within the supply chain who also need their wages to be assessed and increased to the *FC-LIRP* rates if necessary. This would further increase the cost in terms of implementation of the method

and making plans to pay the *FC-LIRP* rates. Moreover, this method lets the farmers decide on the wage that they want to be paid, which puts the validity of the data in question. One solution is to have a post check on this information using available data on the components of fair remuneration that has been gathered by other methods in the region such as the *Anker Methodology* and *WageIndicator Living Wage*. This would ensure the validity of the data and the calculation being close to the real living cost. Moreover, in terms of BellagioSTAMP score, the *FC-LIRP* receives a score of 18, which is lower compared to other methods. There are ways to increase the score and improve the overall system of the method. Similar to other methods, *FC-LIRP* lacks public participation and social engagement in the development phase of the method. Moyee should include the farmers and get their inputs on the needs that have to be included in the calculation based on their actual living costs. Furthermore, to apply this method, this requires Moyee to continuously invest in the method, updating the data and the method to ensure its applicability and validity. However, this could be costly for Moyee so Moyee should also conduct assessment of other methods comparing with the situation of the workers and test whether the estimates provided by these methods could be applied for its supply chain.

Recognising the knowledge gap about product S-LCA approaches on fair remuneration, this research has been done to provide more information on the comparison between different methods and their application. The results from this research highlight key similarities and differences of these methods which have different implications on their applicability and validity. By understanding these points, recommendations have been made for various actor types, including Moyee. A universal guideline for calculation of fair remuneration is recommended to create less confusion on the application of these methods.

Appendix 1 – Real Living Wage

The **Real Living Wage** (RLW) methodology was developed along with the campaign for a real living wage in the United Kingdom (UK) in 2001 (For The Real Cost of Living, n.d.). It is currently being overseen by the Living Wage Foundation. The purpose of this method is to determine the wage rate necessary to ensure that households earn enough to reach a minimum acceptable living standard as defined by the public (Cominetti & Murphy, 2022).

The calculation is done on the construction of a basket of goods and services that represents an acceptable standard of living, as determined through research with the public. To provide a basket of goods, the method uses the Minimum Income Standard (MIS) research done at Loughborough University. Taken from a report from the MIS research (Davis et al., n.d.), the goods and services included in the budgets are: *housing; domestic fuel; food and drink; clothing; household goods and services; health and personal care; transport and travel; social and cultural participation*. For many items in the basket (such as *food, clothing, and utilities*), the costs are similar across the UK. For others, such as housing, council tax, childcare, and travel, the costs vary among London and the rest of the UK, requiring separate data collection that is explained as followed:

Housing. The average rents are taken from the UK Housing Review, using the London estimate and an average for the UK excluding London.

Council tax. Information is taken from MIS research with different assumptions for London and the rest of the UK.

Travel costs. For the rest of the UK, travel cost assumptions are taken from the MIS research. For London, a weighted average is used across Inner and Outer London families.

Childcare costs. Costs are calculated using data constructed by the Family and Childcare Trust.

Pension contributions. 5% contribution on qualifying earnings.

In terms of tax and benefit system, the method applies the calculation from the Resolution Foundation micro-simulation model to determine the taxes paid and benefits received by each family type. It also includes a '*shock absorber*', with rate being inflation plus or minus 3%, to manage the impact of any extreme year-to-year variations.

The calculation of real living wage works on the basis of an adult working full-time with 37.5 hours per week, meaning 1950-h working year. The rates are presented for 17 different household compositions, then a single rate is presented as the weighted average of those household compositions for London and the UK.

Appendix 2 – Living Wage Calculator

Living Wage Calculator (LWC) was developed by Dr. Amy Glasmeier at the Massachusetts Institute of Technology (MIT) in 2003 to provide a more comprehensive estimation of the employment earnings – or the **living wage** – that a full-time worker requires to cover the cost of their family’s basic needs where they live (Living Wage Calculator, n.d.). It is a market-based approach using expenditure data on a family’s likely minimum food, childcare, health insurance, housing, transportation, and other basic necessities (e.g. clothing, personal care items, etc.) costs that are geographically specific to locations in the United States (US) (Nadeau, n.d.). The living wage is calculated based on these cost elements in addition with income and payroll taxes to determine the minimum employment earnings to necessary to meet a family’s basic needs while also maintaining self-sufficiency.

This method provides estimation for twelve different family compositions: one adult families with 0, 1, 2, or 3 dependent children, two adult families where both adults are in the labour force and working with 0, 1, 2, or 3 dependent children, and two adult families where one adult is not in the labour force with 0, 1, 2, or 3 dependent children. The adults that are in the labour force are assumed to be employed full-time with full-time work assumed to be year-round, 40 hours per week for 52 weeks (a work-year of 2080 hours). The living wage is calculated at the county, metropolitan area, state, regional, and national level in the US.

The living wage is defined as the wage needed to cover basic family expenses (basic needs budget) plus all relevant taxes. The calculation is done using below formula:

$$\text{Basic needs budget} = \text{Food cost} + \text{childcare cost} + (\text{insurance premiums} + \text{health care costs}) + \text{housing cost} + \text{transportation cost} + \text{other necessities cost} + \text{civic engagement} + \text{broadband}$$

$$\text{Living wage} = \text{Basic needs budget} + (\text{basic needs budget} * \text{tax rate})$$

Data sources for each component are explained below:

Food. The food component is compiled using the US Department of Agriculture (USDA)’s low-cost food plan national average, which is the second least expensive food plan offered

from a set of four food plans that provide nutritionally adequate food budgets at various price points.

Childcare. Childcare cost data are county and state-level data collected from state market rate surveys and a survey of county-level childcare provider cost data.

Health. The health component includes health insurance costs for employer sponsored plans, medical services, drugs, and medical supplies. Costs for medical services, drugs and medical supplies are data from national expenditure estimates by household size provided in the Bureau of Labour Statistics Consumer Expenditure Survey. Health insurance costs are calculated using the Health Insurance Component Analytical Tool (MEPSnet/IC) provided online by the Agency for Healthcare Research and Quality.

Housing. The housing component is based on the likely cost of rental housing in a specific area using the Housing and Urban Development (HUD) Fair Market Rents estimates, including utility costs.

Transportation. The transportation component is based on national expenditure data by household size from the Bureau of Labour Statistics Consumer Expenditure Survey, including cars and trucks, gasoline and motor oil, other vehicle expenses, and public transportation.

Other necessities. The other necessities component includes *apparel and services, housekeeping supplies, personal care products and services, reading, and miscellaneous*, based on data by household size from Bureau of Labour Statistics Consumer Expenditure Survey.

Civic. The civic component includes *fees and admissions, audio and visual equipment and services, pets, toys, hobbies, playground equipment, other entertainment supplies, equipment, services, reading, and education*, based on national expenditure data by household size from the Bureau of Labour Statistics Consumer Expenditure Survey. These costs are related to participating in and engaging in civic activities.

Broadband. Costs of broadband and cell phone service are calculated based on a geographic analysis.

Taxes. The taxes component includes federal and income taxes.

Appendix 3 – Anker Methodology

The Anker living wage methodology (AM) was developed by Richard Anker and Martha Anker, who are leading the Anker Research Institute, the United States, in 2005 (Anker Research Institute, 2023). The **living wage** is defined as remuneration received for a standard work week by a worker in a particular place sufficient to afford a decent standard of living for the worker and her or his family (Anker & Anker, 2017). The components of a decent standard of living consist of food, water, housing, education, health care, transport, clothing, and other essential needs, including provision for unexpected events.

Calculating a living wage starts with estimating the cost of basic but decent lifestyle for a worker and his/her family which includes three expenditure groups: food, housing, and other essential expenses for a family, and then adds a small margin for sustainability and emergencies. The next step is to calculate the net living wage by dividing the cost of a basic but decent life for a reference size family by the number of workers per reference size family. Finally, the net living wage is added with statutory payroll deductions and income tax to arrive at the gross living wage. Benchmark studies have been conducted in 22 countries providing living wage estimates on a regional level.

A living wage is calculated for a reference family size, which depends on average household size, total fertility rate, and child mortality rate with a minimum of four members and a maximum of six members. The number of workers per family varies by country and location based on labour force participation rates, unemployment rates, and part-time employment rates. The working hours are the standard working hours per country.

As mentioned earlier, the cost of a basic but decent lifestyle is estimated using the three expenditure groups: food, housing, and other essential needs, with a small margin for sustainability and unforeseen events. The following is the explanation and data sources used for these groups:

Food. Food costs are based on the cost of a low-cost nutritious model diet that is consistent with local food preferences. The model diet must meet Food and Agriculture Organisation (FAO) and World Health Organisation (WHO) nutritional guidelines. The cost of model diet is estimated using local food prices collected via survey of local markets.

Housing. A local standard for healthy housing is set based on international and national standards, and local housing conditions. The cost of renting housing that meets the standard is estimated based on visits to a range of rental homes in the location. This component includes housing, water, electricity, gas and other fuels.

Other essential expenses. The cost of other essential expenses is estimated by multiplying the ratio of non-food and non-housing (NFNH) expenditures to food expenditures by the cost of the living wage model diet. This ratio is constructed by a household expenditure survey. This cost includes: alcoholic beverages; clothing and footwear; furnishings, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; and miscellaneous goods and services.

Post checks for healthcare and education. Information is first collected on local cost of acceptable education and healthcare. These costs are then compared with amounts included for them in the preliminary estimate of NFNH costs with amounts for these increased when necessary.

Provision for unexpected events and sustainability. The total living cost calculated by the total of the components above is then multiplied by the 5% margin to get the amount for unexpected events and sustainability.

For statutory deductions from pay, data used is information on income tax, social security taxes, union fees, and other deductions from pay.

Appendix 4 – Asia Floor Wage

The Asia Floor Wage (AFW) was developed by the Asia Floor Wage Alliance (AFWA), which headquarter is in India, in 2009 to estimate living wages in the garment industry of South and Southeast Asia (*Towards a Woman-Centred Living Wage Beyond Borders The Asia Floor Wage Alliance's Methodology for Garment Workers, 2023*). It defines the **living wage** as the wage earned in a standard working week that allows a garment worker to afford food for themselves and her family, pay the rent, pay for healthcare, clothing, transportation and education and have a small amount of savings for when something unexpected happens.

The calculation is done based on the costs of the components as followed:

Food. The AFWA conducts food basket surveys to calculate the food costs required by a worker and their family. The food basket is calculated in terms of calories intake, which is set at 3000 Kcal per person per day.

Non-food components. Non-food costs are calculated using the ratio between food and non-costs of 45%:55%. The ratio is derived from the AFWA's surveys that started to include non-food components in 2020. Nearly 45% of the non-food costs is spend on *clothing, housing, transportation, education and health*, while the remaining 10% is spend on *entertainment, savings, or pensions*.

The method assumes that each family has one income earner providing for three adult consumption units, with one consumption unit equals to one adult or two children. The living wage calculation is done for a working week of 48 hours, 2496-h working year. The living wage figures of 11 countries uses the Purchasing Power Parity (PPP) conversion factors from the World Bank database to estimate cross-country living wage floor for South and Southeast Asia region.

Appendix 5 – Fair Wage Network Living Wage

Fair Wage Network was set up and developed the Fair Wage Network Living Wage (FWNLW) in 2009, with its headquarter in Switzerland (About Us – Fair, n.d.). It defines the **living wage** as a level of income that allows a worker to meet his/her basic needs and those of his/her family (in terms of food, housing, education, health, etc.) but at decent standards (FWN *Living Wage Methodology*, n.d.).

The calculation uses the basket of goods and services with the following components:

- *Housing* (according to UN-Habitat, UN criteria);
- *Food* (that is enough to ensure 2200-3000 kilo-calories/adult/day);
- *Childcare*;
- *Education*;
- *Healthcare*;
- *Transport & Communication*;
- and a percentage left for *leisure* and/or for some *precautionary savings to face eventual unexpected expenditure*.

For food, a model diet is constructed that reflects both FAO food balance sheets and the food consumption patterns and habits in each country. In terms of housing, the UN Habitat criteria is used to determine minimum housing standards. *Utilities* are included in this component, for *drinking water, electricity, garbage collection or other collective charges, fuel/gas for heating and/or cooking, internet connection, expenditure for maintenance, repairs or replacement of households' equipment*. Food, housing, and other components in the basket are supplemented with data collected through expenditure surveys among workers and local markets/shops.

The calculation is done for a family size along the local fertility rate (2 adults + fertility rate) and adjusted to the number of income earners along the local employment rates. The method has been able to provide 3,000 living wages at the regional level which are adjusted to provide the national average in nearly 200 countries.

Appendix 6 – WageIndicator Living Wage

The WageIndicator Living Wage (WLW) methodology was developed by WageIndicator, a Netherlands-based NGO, in 2014 (Guzi et al., 2022). According to the organisation, the **living wage** denotes the minimum income that is necessary for an employed person to meet his or her basic needs without government intervention in the form of subsidies which include food, clothing, shelter, childcare, transportation, medical expenses. Recreation and modest vacation time.

The calculation of the living wage by this method is composed of six components: food, housing, transportation, health, education, and other expenses (e.g. clothing, personal care), which are explained as followed:

Food. Data is collected through two sources: WageIndicator Cost-of-Living Survey and the United Nations (UN) Food and Agriculture Organisation (FAO) food balance sheet. This data is checked against the balanced diet constructed by the World Health Organisation (WHO). All model diets assume a daily consumption of 2,100 calories per person.

Housing. Data is collected via the WageIndicator Cost-of-Living Survey on rents, *electricity, water, garbage collection, internet, and taxes on housing*, as well as size and location of their apartments.

Transportation costs. The average price of a public transportation monthly pass is regarded as the transport cost for an adult, collected via the Cost-of-Living Survey

Health expenses. The Cost-of-Living survey asks respondents about the minimal monthly healthcare expenses for a family.

Education expenses. The Cost-of-Living survey asks respondents about the minimum monthly expenses on education at public schools for children, with education for adults not included.

Other expenses and provision for unexpected expenditures. For other expenses, it is difficult to have a universal basket of non-food and non-housing commodities. The method adds 5% margin to the final estimation for unforeseen events.

The living wage is presented as the gross monthly wage of a full-time worker, by adding the mandatory payroll deductions such as taxes and social security contributions. The calculation is done for three family types: individual, standard family (2 adults + 2 children), and typical family (2 adults + national fertility rate), with the number of workers per family capped at 1,5 – 1,8. The working hour is a standard working hours per country. This method has provided living wage estimates for 161 countries, including their individual regions.

Appendix 7 – Oiconomy Pricing

Oiconomy Pricing (OP) was developed in 2015 by Pim Croes and Walter Vermeulen at Utrecht University. It is a fully inclusive people, planet, and prosperity assessment of the distance-to-sustainability of a product which is also referred to as the hidden costs (Croes & Vermeulen, 2015). To determine the hidden costs in terms of unfair prices for labour, the authors developed a **fair minimum wage** standard to supplement for the OP tool (Croes & Vermeulen, 2016). For the calculation of fair remuneration, this method proposes two different benchmarks: fair minimum wage for higher income countries and absolute fair minimum wage for lowest-income countries.

For fair minimum wage, it is set at 44.4% of a country's gross national income (GNI) per capita as the mean proportion of the minimum wage of the GNI per capita of the top 20% performing countries, referred to the benchmark group, in the Sustainable Society Index – Human Development (SSI HD).

Another benchmark must be set for the lowest-income countries as the fair minimum wage is too low for them, so the absolute fair minimum wage is proposed as the bottom cut-off. For this calculation, the following components are considered: working hours, family size, labour participation and poverty line. The number of working hours is set at 1864-h work year, with a standard work week of 40h, 49 work weeks, and 12 public holidays. For family size, the calculation is done for a family of 4, 2 adults with 2 children, as a reasonable and sustainable choice. In terms of labour participation, information on life expectancy and number of working years is required. The average life expectancy of the benchmark group is 78,34 years while the average number of working years is 46,21 years. It means that a person must earn $78,34/46,21 = 1,70$ times a living income throughout his/her working life. This method then assumes that one of the parents can only earn half of the income, but only during half of his/her working life, meaning that the average worker must earn 25% of the lost income of the other parent. This results in the fact that an average worker has to earn $1,70 \times 1,25 = 2,12$ times a living income for one person. This fair minimum wage benchmark then applies the World Bank's \$2 a day moderate poverty line at 2005 US\$ Purchasing Power Parities (PPP). Hence, the absolute fair minimum wage is set at $365 \times 2 \times 2,12 = \$1546,96$ per year.

Appendix 8 – Alberta Living Wage

The Alberta Living Wage Network (ALWN) developed a standard methodology and started calculating living wages in 2021 for the communities in Alberta, Canada (Alberta Living Wage Network, 2023). The **living wage** is defined as what people need to earn to cover the actual costs of living in their community (*Alberta Living Wage Report, 2022*). It works on the assumption that each adult is working full time (35 hours/ week and 1820-h work year) and the living costs include more than the basics of food, clothing, and shelter, in addition with unexpected costs, small investments in education, childcare, and participating in the community.

The calculation is done for three household types: an individual, a lone-parent family with one young child, and a two-parent family with two young children. The following explains data sources used for the components included in the calculation:

Shelter. Data on housing is taken from Canada Mortgage and Housing Corporation's (CMHC) Housing Market Information Portal. Estimates for utilities are based on the Utilities Consumer Advocate's Cost Comparison Tool. Tenant insurance is based on community-specific Square One estimates. Supplementary data is provided by the Canada Rental Housing Index when necessary.

Food. Food costs are based on Health Canada's National Nutritious Food Basket (NNFB) adapted by Alberta Health Services for the local communities.

Transportation. Transportation costs are based on the Canadian Automobile Association's Driving Cost Calculator.

Childcare. Data is based on the actual costs of local providers.

Clothing & Footwear. Data is based on Statistics Canada's Survey of Household Spending (SHS)

Healthcare. Data is based on Alberta Blue Cross, LowestRates.ca, and PolicyAdvisor for health insurance, life insurance, and critical illness insurance, respectively.

Tuition. Data is actual costs of post-secondary education in the community, including parent education.

Other household items. These costs consist of: telephones and telephones services; household supplies; furniture, furnishings, electric appliances; personal care; home entertainment, sports, and recreation; reading materials and supplies; and others. For calculate other expenses, a multiplier is used that is constructed by Statistic Canada's Market Basket Measure (MBM), at 75.4% of food and clothing & footwear expenses gathered above.

Contingency. Two weeks' pay is set aside for unexpected events.

Tax & benefit programs. This method includes tax deductions, tax credits and government benefits.

Appendix 9 – FairChain Living Income Reference Price

FairChain, together with Moyee Coffee, developed the FairChain Living Income Reference Price (FC-LIRP) in 2022 to determine a living income or living wage that is necessary for a person or family to live a decent standard of living, also taking into account education and healthcare, among other costs (*How to Determine a Living Income Reference Price Based on Farmers' Knowledge, Experience and Self-Identified Needs The FC-LIRP Methodology*, n.d.). The method was developed with the inspiration from the living income reference price that was developed by Fairtrade International.

A **farmer's salary** is one of the components that make up the FC-LIRP, representing the fair remuneration rate for farmers. It is defined as the amount of money one full-time farmer should earn in one year to cover the costs of decent living for the average household size in the area. This includes expenses such as *housing, food, education, healthcare, savings, and unforeseen expenses*.

The calculation of the farmer's salary is done by collecting data from the farmers in focus groups. The focus group session is separated in two parts:

Part 1: Monthly costs per household. Participants fill out a household costs template sheet with their answers of what the monthly costs are for an average household to live a decent living, based on the above-mentioned components.

Part 2: Looking at other salaries. Participants are shown with a list of salaries of other occupations and have discussion. They then vote to come to a consensus on a farmer's salary that they want to be paid so they can have a decent living.

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