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Value chain analysis of coffee: A story on journey of cherry from production site to consumer cup

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Abstract

This study was conducted in 2017 AD to analyze the value chain of coffee in Gulmi and Palpa districts of Nepal. The major objective of this study is to map the value chain of coffee and to analyze marketing cost and margin of various marketing actors in the study area. One hundred and sixty coffee producers were selected by a three- stage sampling procedure. Furthermore, 10 input suppliers, 10 traders and 5 consumers were randomly selected and interviewed from each districts. The producers share in consumer's price was found 64.05%. The gross contribution margin of collectors, processors and retailers was found 30.51%, 39.00% and 0.90% respectively while the total gross marketing margin was found 35.94 %. The gross marketing margin equivalent to one kg of fresh ripe cherry for coffee producers, collectors, processors and local retailers were found NRs 10.59, NRs 38.14, NRs 48.75 and NRs 1.125 respectively. Coffee is major commodity for income generation so policy intervention and advanced technologies on production, marketing and value addition should be imparted to farmers.

Key words: Benefit cost ratio, coffee, gross contribution margin, producers share, value chain

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INTRODUCTION

Coffee is an evergreen plant which falls under family *Rubiaceae* and genus *Coffea*. Coffee is a very profitable enterprise for Nepali farmers because the study of PACT (2012) had found that a farmer can earn four times more than maize cultivation and three times more than millet cultivation from coffee cultivation. Similarly, the study of Kandel (2009) found that coffee cultivation is 4.33 times profitable than traditional crop maize and 3.30 times profitable than millet.

Nepali high altitude speciality coffee has very high demand in National and international market. NTIS (2016) had also identified coffee sector as third most export potential sectors of Nepal. Despite of high demand of Nepali specialty coffee in the international market the export of Nepali coffee is very low. According to Nepal national sector export strategy (2017) the total exports of coffee from Nepal for the period of 2010/11 to 2014/15, in spite of a substantial decrease of 22.71% in export quantity there was still a 1.63% increase in export value. For exports to the Netherlands, Canada and Japan, there was a sizeable increase in both the export quantity and value.

Dereje (2007) used value chain approach to study the competitiveness of Ethiopian coffee in the international market and revealed that Ethiopian farmers have low level of education, large family size with small farmland and get only 3% of the retail price in the German market.

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Thus, policy intervention was suggested to improve farmers' performance. Value addition is one of the important aspects of value chain analysis. Value addition in value chain refers to the enhancement in the product or services as it passes from one stage to the next before it reaches to the end consumer. PACT (2012) estimated the value addition of coffee in each stage from farm to retailer which showed that farmers added 87.5% value to the fresh cherry over cost of production. In the same way, pulper operator added 42.5%, huller added 107.5%, roaster grinder added 108.75% and retailer added 65.45% value over cost of production of fresh cherry. Shrestha (2009) had found that producers share was the highest with 31.50% and roasters had the lowest share value with 10.17% in coffee value chain. Value shares of pulper, trader/huller and retailer on consumer's price were 15.25%, 13.75% and 16.67% respectively.

According to NTCDB (2017) the area coverage of coffee cultivation or plantation shows increasing trend from 2010/11 AD to 2016/17 AD. According to commercial coffee survey report by CBS (2019) coffee production is done in 32 districts of Nepal covering 973 ha land. Poudel et al. (2009) found that marketing channel of coffee in Gulmi was very short where farmers sold their coffee to CCU, which is directly exported to Japan and South Korea from Kathmandu at the price of 6 USD per kg free on board. Furthermore, the study showed that marketing margin was NRs 225 with producer's share 50% on the export value.

The major objective of this study is to map the value chain of coffee and to analyze marketing cost and margin of various marketing actors in the study area.

MATERIALS AND METHODS

The representative sample was collected by using three stage random sampling procedure. In the first stage, Gulmi and Palpa districts were selected purposively considering their great potentiality of coffee production in Nepal. In second stage, four coffee producing villages from each district were selected randomly. In the third stage, twenty coffee producers were selected from each village by using snow ball method. In this way one hundred and sixty coffee producers were selected by three- stage sampling procedure.

Furthermore, 10 input suppliers 10 traders and 5 consumers from each district were interviewed by selecting them randomly (Table 1).

Table 1. Summary of sampling sites and sample size for HH survey of coffee producers

Districts	Name of selected VDC	Number of sample Households
Gulmi	Gulmi durbar-3	20
	Chhatrakot-4	20
	Ruru-4	20
	Ruru-3	20
	Subtotal (n_1)	80
Palpa	Ribdikot-2	20
	Tansen-8	20
	Nisdi-7	20
	Tansen-5	20
	Subtotal (n_2)	80
Total Number of selected coffee producers in sample ($N = n_1 + n_2$)		160

Source: Own computation

Results and Discussions

Value chain map of coffee

Value chain mapping shows all those activities that set the journey of fresh ripe coffee seeds from the site of production to consumer cup (Figure 1). According to UNIDO (2009) value chain map is a graphical representation showing the major actors and their relationship along with the sequence of activities involved in the value chain. In the process of transferring coffee seeds from farm to the consumer cup it undergoes various forms and upgrades its value at every step as it passes through different actors involved in coffee value chain.

In this study the major actors involved in the coffee value chain were input suppliers, coffee nurseries, coffee producers groups, coffee producers' cooperatives, collectors, pulper operators, coffee cooperative union, processors and retailers which is in support with the study by Kattel (2009) in Gulmi and Kavre districts that found input suppliers, small holder farmers, pulping operators, coffee producers' associations, cooperatives and a private company as the major actors contributing in the coffee value chain.

The movement of fresh ripe cherry from production site to consumer cup transforming into various forms (i.e fresh ripe cherry, parchment, green beans, roasted beans, coffee powder, brewed coffee and so on) as it passes to upstream marketing actors within the value chain structure is like a long journey but in this study the value chain network of coffee in the study area was very short and simple because 100% of the coffee producers were found selling their fresh ripe cherries to

Primary coffee cooperatives and private pulper operators.

In this study, pulper operators were found performing the dual role because in addition to pulping of cherries they perform the role of fresh ripe cherries collector as well. Hundred percentage(100%) of these pulper operators or collectors were found selling their parchment (product obtained after pulping followed by 24 hours of shade drying till the moisture levels falls to 12%) to the Coffee processing unit (CCU) and the processed coffee is sold in domestic and international markets (Figure 1).

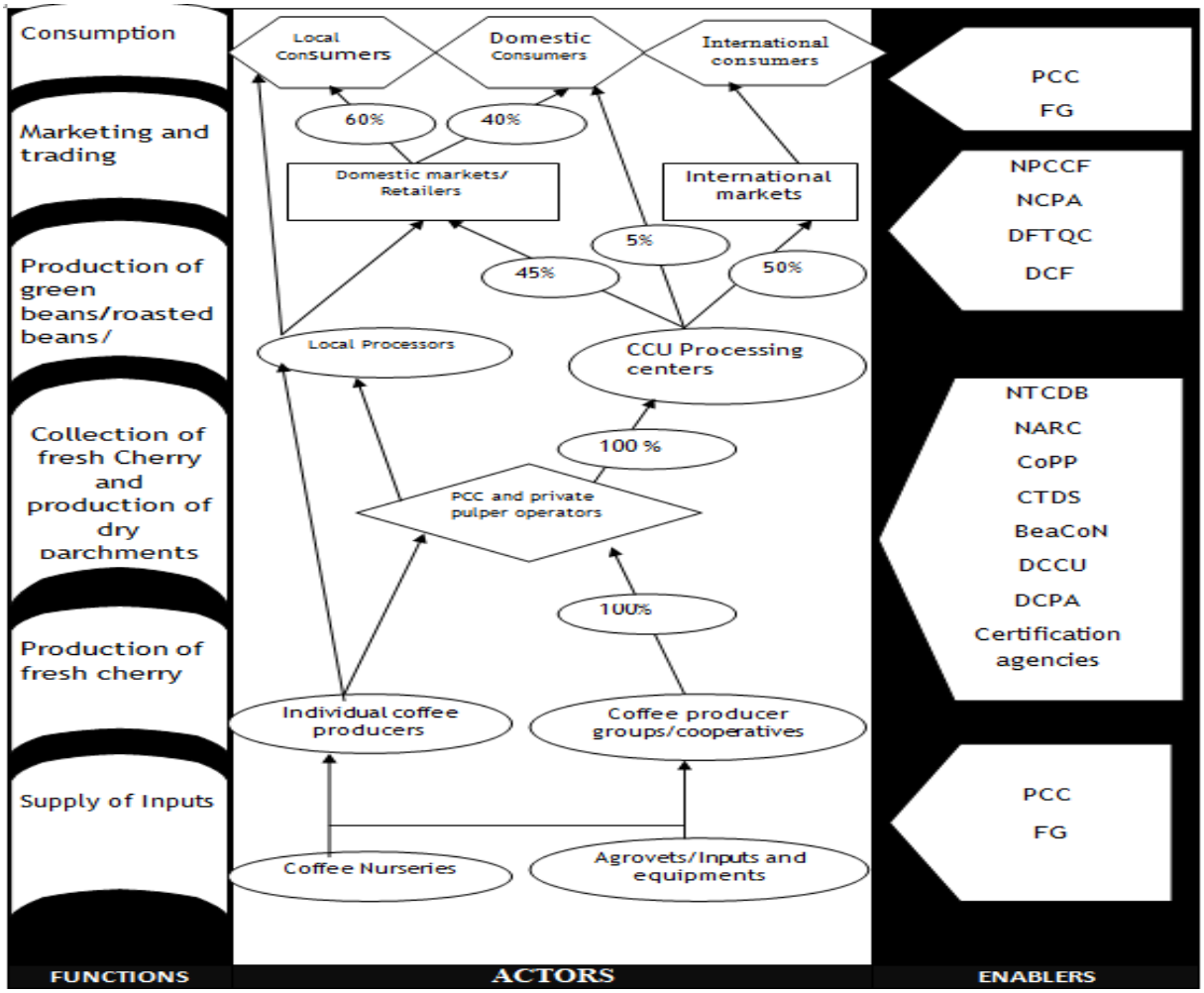

Figure 1. Value chain map of coffee (Field Survey, 2017)

Value chain actors, enablers and their role in coffee value chain

In this study, coffee nursery farms and agrovets were major inputs suppliers whose major role was to supply necessary inputs for coffee production to coffee producers. In this study seeds,seedlings,organic manure and simple trainings and pruning tools were major inputs used in production of coffee which is in support of study by Bhandari, Luitel and Panta (2018) where they found manure, seeds/seedlings, organic pesticides and tools and equipments as the major inputs used by coffee producers of central hills of Nepal.Coffee producers were those actors who produce fresh ripe cherry and sell these fresh ripe cherry to collector and pulper. Collectors were those actors in the value chain

who sell collected fresh ripe cherry from coffee producers to pulper operators. In this study it was more evident that local collector themselves played the role of pulper operator as well. Secondary processors were those value chain actors who process dry parchment bought from the pulper operator to produce green beans by hulling.

In this study, CCU Gulmi and CCU Palpa were secondary processors in the study area. The coffee produced and processed in study area target three types of market i.e local market, domestic market and international market. The lower graded green beans processed by using household tools were used for home and local consumption. These poorly graded coffee more bitter in taste than imported coffee like Nascafe. The evenly sized green beans produced by CCU Gulmi and CCU Palpa were exported to South Korea and Japan. Consumers are those who buy coffee with the intention of consumption and deriving satisfaction. Basically there were three types of consumers' i.e local consumers, domestic consumers and international consumers. The various institutions involved in governing the coffee value chain of Nepal, providing enabling environment are National Tea and Coffee Development Board (NTCDB), Nepal Agricultural Research Council (NARC), Coffee and Tea Development Section (CTDS), Coffee Development Centre, Central Coffee Cooperative Union Ltd (CCCUL),Nepal Coffee Producers Association (NCPA), Coffee Promotion Program (CoPP) launched by HELVETAS, Beautiful Coffee Nepal (BeaCoN), Project for Agriculture Commercialization and trade (PACT) etc.

Marketing channels of coffee

Marketing channels of the coffee are the ways or networks through which the coffee passes from production site to end consumers. In this study four marketing channels with few marketing actors were identified (Figure 2) which is in support with findings of study by Kattel (2009) where he found few traders and processors primarily governing the present marketing channels of coffee in Nepal because of the insufficient market information, quality improvement and processing facilities.

In this study,100% of the fresh ripe cherries was found selling to pulper operators by farmers. These pulper operators were found selling 100% of the parchments(product obtained after pulping followed by 24 hours of shade drying till the moisture levels falls to 12%) to processors or coffee cooperative union (CCU). These coffee cooperative unions or processors process the parchment into green beans and coffee powders. The coffee powder is targeted for domestic and local consumers while green bean is targeted for international consumers. In this study, coffee cooperative union or processors were found selling 45%,5% and 50% of the processed products to retailers, domestic consumers and international consumers respectively in their respective marketing channels C-I, C-II,CIII and CIV (Figure 2).

Furthermore, the retailers were found selling 60% and 40% of processed products (coffee powders in this case) to local consumers and domestic consumers respectively in their respective marketing channels C-I and C-II (Figure 2).

Channel-I: Producers⇒Pulper operators ⇒ Processors⇒ Retailers⇒ Local consumers
Channel II: Producers⇒Pulper operators⇒ Processors⇒ Retailers⇒ Domestic consumers
Channel III: Producers⇒Pulper operators⇒ Processors ⇒ Domestic consumers
Channel IV: Producers⇒Pulper operators⇒ Processors ⇒ International consumers

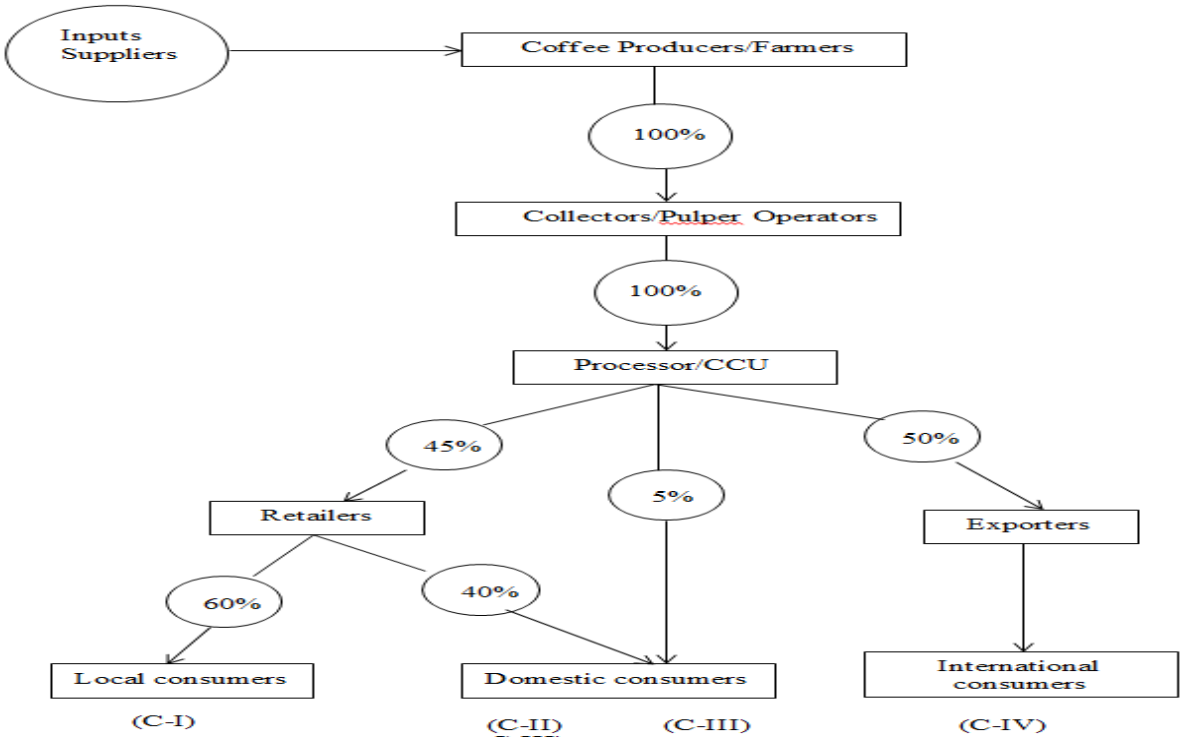

Figure 2. Marketing channels of coffee value chain in study area (Field Survey, 2017)

Marketing margin and marketing cost

Coffee producers

Farmers need seedlings and other inputs for production of coffee. The average cost for dry cherry was estimated as NRs 110/kg from focus group discussion and interview with key informants. The average cost of production of fresh ripe cherry was found NRs 69.48 per kg which is in consistent with findings of study by Bhandari, Luitel and Panta (2018) where they found NRs 69.03/kg as the cost of production of fresh cherry. Moreover marketing cost also occurred during bagging, packing, communication, transportation and finally bringing to collectors. On an average selling price of fresh harvested cherry and dry cherry were found NRs 80.07 /kg and NRs 135/kg respectively. Therefore when a farmer sale their coffee to collectors the gross margin for fresh ripe cherry and dry cherry were NRs 10.59/kg and NRs 25/kg respectively which is lower than the findings of study by Shrestha (2009) where he found NRs 19/kg as the gross marketing margin of fresh ripe cherry. Though the marketing margin of freshly harvested cherry seems less than dry cherry but freshly harvested cherry has weight advantage because of more moisture in it than dry cherry.

Collectors

The collectors purchase freshly harvested ripe cherry from coffee producers/farmers and play bulking role. In this study, almost all of the collectors interviewed had dual role of collector as well as pulper operators. In this study the gross margin of collectors is the difference between what they purchased at farm gate and sold to CCU. The pulping of freshly harvested cherry by pulper operators transform into dry parchment after drying. The average variable cost of production of one kg of dry parchment was NRs. 341.08 as illustrated in (Table 2). Mostly the processors and forward linkage of dry parchment is located in district headquarters. The average selling price of dry parchment was found NRs 500/kg. Hence the gross margin of collectors was found NRs 158.92 per kg of parchment. The gross margin of collectors' equivalent to one kg of fresh ripe cherry after its transformation into parchment was found NRs. 38.14 (Table 2).

Table 2. Marketing margin and marketing cost (2017)

Marketing actors	Form of coffee	Average cost of production and marketing (NRs/kg)	Average selling price (NRs/kg)	Gross marketing margin (NRs/kg)	Gross marketing margin equivalent to one kg of fresh ripe cherry(NRs/kg)
Coffee producers	Fresh ripe cherry	69.48	80.07	10.59	10.59
Collectors	Dry parchment	341.08	500	158.92	38.14
Processors	Coffee powder	600	990	390	48.75
Local Retailers	Coffee powder	991	1000	9	1.125

Note: Conversion factor was adapted as below:
100 kg ripe cherry = 35-38 kg dry cherry = 23-24 kg dry parchment = 16.5 to 18.5 kg green beans (FNCCI/AEC, 2006) ; 4 kg ripe cherry = 500 gram coffee powder (Regmi & Shrestha 2005)

Source: Field survey (2017)

Processors

The pulpers of study site sold their dry parchment to Coffee cooperative union (CCU). CCU further processes the dry parchments and convert into green beans after hulling and fine coffee powder after grinding roasted beans. Green bean is major exported product of coffee while roasted fine coffee powder was packed in three different packets 100 gram, 500 gram and 1000 gram with average price of NRs 100, NRs 500 and NRs 1000 respectively and sells them targeting local and domestic market. CCU sells these 100gram, 500 gram and 1000 gram packets to retailers at the rate of NRs 90, NRs 490 and NRs 990 respectively as the wholesale price. As this study, was focused in domestic market only the average cost of green beans was not estimated. The average cost of production of one kg of coffee powders was estimated as NRs. 600 by focal group discussion and interview with key informants. Hence, the gross margin of processors was found NRs. 390. The gross margin of processors equivalent to one kg of fresh ripe cherry after its transformation into coffee powder was found NRs. 48.75 (Table 2).

Retailers

Local and domestic retailers buy available packets (coffee powder) from CCU and sell to local and domestic consumers by adding certain margin to them. During the time of this study three different size packets of grinded coffee powders were available in market i.e 100 gram, 500 gram and 1000 gram with average price of NRs 100, NRs 500 and NRs 1000 respectively. The retailers buy grinded coffee powder at the rate of NRs 90, NRs 490 and NRs 990 respectively as the wholesale price and finally sell to local and domestic consumers with average price of NRs 100, NRs 500 and NRs 1000 for 100 gram, 500 gram and 1000 gram packets respectively. In case of local retailers, their average cost of marketing coffee powders was found NRs 991/kg. Hence, the gross marketing margin of local retailers was found NRs. 9/kg. The gross margin of local retailers' equivalent to one kg of fresh ripe cherry after its transformation into coffee powder was found NRs1.125 (Table 2).

Market share of value chain actors

The producers share in consumers' price or gross marketing margin of producers was found 64.05% which was higher than the findings of study conducted by Good Neighbors (2018) where they found 35% as the coffee producers share in consumers' price in Nepali market. The total gross marketing margin was found 35.94 %.The gross contribution margin of collectors, processors and retailers was found 30.51%, 39.00% and 0.90% respectively (Table 3). Contribution margin shows the the incremental profit earned for each unit of coffee sold .According to Bragg(2018) contribution margin is a product's price minus all associated variable costs. In this study, contribution margin of processors is highest (39.00%) which clearly indicates that the incremental profit earned for every units (kg) of coffee sold for the processors was high compared to other marketing actors.

Higher contribution margin of the processors clearly indicates that processing add value to the products.Hence it is suggested for coffee marketing actors to adopt advaned processing and packageing techologies to upgrade value of products and increase competitive strength of products in national and international market.

Table 3. Market share of value chain actors (2017)

Contribution Margin	Coffee market (%)
Total gross marketing margin(TGMM)	35.94
Producers share in consumer price or Contribution margin for producers(GMM_P)	64.05
Contribution margin of collectors (GMM_c)	30.51
Contribution margin of processors (GMM_p)	39.00
Contribution margin of local retailers (GMM_R)	0.90

CONCLUSIONS

Coffee is one of the major potential cash crops for western mid hilly region of Nepal dominated by small coffee producers groups and cooperatives. The coffee producers predominantly live in rural areas of study area with unsatisfactory road connectivity, marginalized and struggling with the shadow of backwardness, subsistence cereals oriented agriculture with poor access to irrigation facilities.

Value chain structure or network of study area was found short and simple. Value addition activities were found insufficient in study area. Large number of coffee farmers was found dependent upon few pulper operators with few muscular pulping machines. Besides, very low grade technologies were used for roasting and other processing activities that deficit the taste of coffee as demanded by consumers. Hence, it is recommended to use modern advanced processing and packaging technologies to increase the market competitiveness of Nepali coffee.

Role merging of various marketing actors of coffee was prevalent in study area leading to inefficient products transformation and value upgrading of coffee. The pulper operators in study area were found performing dual role of both collector of freshly harvested ripe cherry beside pulping activities. The Coffee cooperative union was found performing role of different marketing actors like parchment collector, roaster, huller, distributor of coffee powders in local and domestic retail markets and performed role of exporter as well leading to inefficient value upgrading function. Hence it is recommended to policy makers to make such legal frameworks that reduce the role merging issues for efficient product transformation and value upgrading of coffee.

Table 4. Abbreviations

AD	Anno Domini
CBS	Central Bureau of Statistics
PACT	Project for Agriculture Commercialization and Trade
MOAD	Ministry of Agriculture and Development
MOALD	Ministry of Agriculture and Livestock Development
MOLMAC	Ministry of Land Management Agriculture and Cooperatives
USD	United States Dollar
PCC	Primary Coffee Cooperatives
FG	Farmers groups
NCPA	Nepal Coffee Producers Association
DFTQC	Department of Food Technology and Quality Control
DCF	District Cooperative Federation
NARC	Nepal Agricultural Research Council
CPP	Coffee Promotion Program
CTDS	Coffee and Tea Development Section
DCCU	District Coffee Cooperative Union
DCPA	District Coffee Producer Association
FGD	Focus Group Discussion
JT	Junior Technicians
JTA	Junior Technical Assistants
NRs	Nepalese Rupees
NTIS	Nepal Trade Integration Strategy
NTCDB	National Tea and Coffee Development Board
NARC	Nepal Agricultural Research Council
CCU	Coffee Cooperative Union Ltd
BeaCoN	Beautiful Coffee Nepal
B:C ratio	Benefit Cost ratio

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