Constraints Affecting the Increase of Sago Production: A Case of Melanau Rural Youth's Participation in Sago Industry in Sarawak, Malaysia

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Abstract
Sago industry which comprises sago cultivation, processing and sago-based food entrepreneurship has its own youth participation challenges. Consequently, the study aimed at determining constraints factors affecting rural youth sago producers. The constraint factors, namely internal and external factors are developed from modelling reason action theory. Data were collected from 200 youth sago producers in Mukah Division via face-to-face interview using a close-ended questionnaire. The data were analysed by means of descriptive statistics, exploratory factor analysis and binary logistic regression model. The descriptive statistic showed the pattern of youth participation in the sago industry. The result of exploratory factor analysis identified six constraints factors affecting youth sago producers; commodity price, new knowledge, physical infrastructure, income, assistance and training. The result of binary logistic regression showed that the low participation of part-time to full-time participation of youth sago producers is significantly influenced by new knowledge, physical infrastructure and training constraint factors. The study suggests rural youth requires technological advancement in the sago industry. In addition, the findings may provide useful information to the relevant stakeholders to re-evaluate the assistance and support programs to increase the participation and productivity of the Melanau youth. Furthermore, encouragement be given to more non-Melanaus to participate in sago industry.
Keywords: Sago Industry, Youth, Work, New Knowledge, External-Internal Constraints Model, Factor Analysis

Introduction
Sago palm is an indigenous crop of rural communities in Asia and the Pacific Region. Specifically, rural communities in Indonesia, Papua New Guinea and Malaysia respectively are

the main producer of sago commodity. The economic activity of sago has played an essential role in sustaining rural livelihood either for subsistence, trading at the local and domestic market as well as for export. In Malaysia, some Melanau community resides in Mukah Division depend on sago as their livelihood. In Indonesia, rural community that associate their livelihood with sago include Luwu community in Luwu Utara Regency, South Sulawesi Province (Trisia, 2017) and Marind and Mandobo tribes in Merauke Regency, Papua (Simatupang, 2019). In Papua New Guinea, Arapesh people of Sepik River Basin consume sago (Toyoda, 2008). Rural youth are involved in different activities of sago production as a continuation of their family work tradition. However, sago farmers and landowners are predominantly rural people of 40 years old and above both in Indonesia (Wardis, 2014) and Malaysia (Yaakub, Mohamad Naim & Awang Hamdan, 2018). Likewise, in the downstream sector rarely cottage industry of sago-based food products business venture is owned by female youth, instead, it mainly comprising of 40 years old women and above (Taibi, Ishak & Tuah, 2018).

Constraints factors can be viewed from external and internal perspectives. On the one hand, the external constraints factors refer to the stigmatization of agriculture sector and working condition as the sector is included in the "4Ds" employment category (Ahmad, et. Al., 2018). The 4Ds refer to dirty, dangerous, difficult and demeaning employment where youth avoid these jobs. Furthermore, rural youths have more job options in the service and manufacturing sectors as a result of urbanization. Moreover, education attainment has allowed them to obtain technical and professional jobs. On the other hand, the internal constraints factor refers to the challenges that exist within the specific agriculture sector. The common constraints faced by smallholders are lack of infrastructure, credit access and land ownership. However, innovation in farming method and mechanisation in performing daily tasks as a result of technology advancement in agriculture may slowly change the stigma and ease the working condition.

The Sarawak government envisions more involvement of youths in agriculture sectors. The data in 2018 showed that out of 171,192 farmers registered with Sarawak Area Farmers' Association *(PPK)*, youth comprises 20,543 or a total of 12% (*Utusan Borneo*, 2018). Overall, the total number is increasing if compared with the figure in 2017, where the total farmers were 168,000 (Gari, 2017). However, youth have shown interest to involve in more appealing agriculture sectors including pepper, oil palm and honey *(kelulut)* processing but sidelined sago as the cash crop is not in the top list (*Suara Sarawak*, 2019). The lack of participation among rural youth the sago industry needs to be studied as it affects the future of this industry. The current ageing of many local sago smallholders and workers in the sago-related cottage industry suggested that rural youth needed to take over the jobs of their parents in the upstream and downstream sectors of the sago industry

The general aim of the paper is to determine the constraint factors of youth sago producers' participation in the sago industry. The factors are investigated based on the internal and external environment of the sago industry. The objectives of the paper are, to study the constraint factors of youth productivity in the industry, and to determine the effect of constraint factors on youth participation in the industry.

Literature Review
Constraints and Work in Sago Industry
This section discusses the external constraint factors. The factors are derived from stakeholders' effect of sago industry management on youth involvement.

Mukah Division Sago producers are those who participate in two sectors of economic activity, namely upstream and downstream of the sago industry. The upstream sector consists mainly of smallholders and members of their family including their wives involved in growing, harvesting and selling the crop to the mills. There are also middlemen who have leased the sago trees from farmers. Smallholders refer to the farm operation, which is dependent on family members (Toader & Roman, 2015). Currently, Sarawak's Melanau youths have been involved in farm works that have been passed down from their family over many generations. During weekends and school holidays, early teenagers and teenagers who are still in school will help their parents on the farm or engage in odd jobs at other farms. Sago smallholder's family receive various assistances and supports from various government bodies (*Borneo Post Online*, 2018).

The challenge of the upstream sector is transporting sago boles outside of the orchard. Apart from the farmers who owned and worked on the land, some labourers work as a sago harvester to fell the tree and push the cut logs from the inland orchard to the river or roadside. Then the logs are floated in the river, or transported to sago mills by lorry. Some orchards are further inland, making the production of logs increasingly difficult as well as the soft peat soil makes it difficult to push the cut logs.

The challenge of the downstream sector is on the unsatisfactory sago price for sago bole as compared with its production price. The sago mill is privately owned by individuals in the downstream sector, and it provides youth employment. This company is purely a private business where the operation. There was a government agency attempt in the past to build a mill for sago processing, but it was only short-lived. The sago pith is transformed into sago flour by six mills in Dalat and two mills in Mukah. A Sago Board is proposed to the authority as a mechanism for providing the smallholders with a decent commodity price of sago boles (Naim, Yaakub, Hamdan, 2016). The mill converts the logs into sago starch, and the commodity is finally ready for export and sale to retailers.

Finally, there is the sago entrepreneurship in downstream work and employment, where they use sago starch to produce and sell varieties of traditional food for commercial use. Various federal and state ministries generously provide funds, equipment, advice, and training to assist women entrepreneurs across the country (Ming & Siong, 2014). Women use sago flour to make sago pellets as a traditional staple food for the Melanau community in the cottage industry (Taibi, Ishak, & Tuah, 2017). Other women make local biscuits, *tebaloi* which promote indigenous ethnic Melanau food for tourism purposes. Women also sell biscuits and cake at the local market that are made from sago flour. Besides, sago producers could be involved in both the upstream and downstream sectors; they can be farmers, and they are also sago-food entrepreneurs.

Table 1 showed that the sago cultivation is occupied by 46,768 hectares of smallholders ' land and a small number of mini estate of 4,750 hectares with total 51,518 hectares in 2017. These figures did not achieve the targeted plan that had been set up in 2006. According to the Mukah Division 's Strategic Development Plan 2006 - 2010, it supposedly had 53,538 hectares of sago area targeted by the end of the 9th Malaysian Plan in 2010, (*Rakan Sarawak*, 2006; Forouhari et al., 2019). Furthermore, the estate plantation scheme established in 1987 that targeted 250,000 hectares of sago plantation by the end of 2020 was also far from the goal *(Borneo Post, 2014).*

Table 1:
Sago Cultivation Area in 2017

	Matured (Ha)	Immature (Ha)	Total (Ha)
Small Holder	28,110	18,658	46,768
Mini Estate	1,220	3,530	4,750
Grand Total	29,330	22,188	51,518

Source: Sago starch 10 years performance (2017)

Sago starch has high demand but the supply is limited (*Borneo Post Online*, 2018). Indonesia also experiences low production as opposed to the large area of the available sago palm tree (Ahmad, 2014). Sago starch production in Sarawak has stagnated for the past 20 years although the total area of cultivation is increasing (Edgar, 2019). Sago starch has increasingly found commercial values in food and non-food industries as well as being a traditional staple food for certain indigenous communities. Sago flour is ranked 4th as an export commodity that contributes to Sarawak revenue of industrial crops after palm oil, pepper and cocoa (Chew et al., 2012).   In 2017, Sarawak's export volume for sago starch was 40,885 mt valued at RM86.6 million where approximately 52% is exported to Peninsular Malaysia, 33% to Japan and the rest is to other countries as well as for domestic consumption (*Borneo Post Online,* 2018). According to a report, Malaysia also imports sago starch from Thailand for the country's consumption (BFRO, n.d) to fulfil the higher demand of the flour in Peninsular Malaysia.

Youth Involvement
This section discusses the internal constraints that fall within the categories of socioeconomic, cultural and behaviour. These categories shape the perception of individuals on their industry involvement.

Sago is produced uniquely by the people of Melanau and the source of labor comes mainly from the region. Melanau youth have been exposed and engaged in economic sago activities since they were young, depending on the type of sago sectors that their family are involved in. Mukah Division Sago starch had been traded to Singapore and Brunei since the 1800s. Sago trees are considered savings for Melanau smallholders where they can harvest the trees whenever they are short of large amounts of cash for important occasions (Ishak, Taibi & Yaakub 2017). On a positive note, the norm provides them with a sense of economic stability. Moreover, smallholders who lease the sago tree will get the cash whenever they need from

the middleman. On the other hand, the norm plus the laid-back rural lifestyle may contribute to a placid attitude towards the motivation in increasing their participants. Additionally, the practice may contribute to the inappropriate time of sago harvesting that leads to low starch extraction.

Young people have a diverse choice of jobs and some of the incentives offer better income. Studies in Malaysia and other developing countries found that youth expects a better salary from the agricultural sector for them to participate in the agriculture sector. A study conducted among rural youth who live in oil palm resettlement. They willing to work in oil palm employment provided the wages are better (Abdullah, Ahmad, Ayob, 2016). Rural youth determinants to participate in agriculture is Abia State Nigeria is also depended on wage (Agwu, Nwankwo and Anyanwu, 2012). Mukah Division is situated at the strategic location of rich natural resources including its coal-mining and logging areas in the neighbouring Sibu Division. The Mukah Division's main cash crop, which is oil palm, also competes with the sago industry in attracting young Melanau to work in the oil palm industry., the Mukah Division also has colleges and pre-university education that allow young people to pursue technical and professional jobs. Eventually, since 2008, there has been rapid urbanization where Mukah Division is partly developed under the development schemes of the Sarawak Corridor of Renewable Energy (SCORE). The project is planned to make rural areas more open to economic development as well as to provide young people with job opportunities including in manufacturing.

The physical characteristics of the sago palm and cultural practice effects either part-time or full - time mode of work of sago farmers. The maturity period of sago palms where it takes 10 - 12 years to be harvested is one reason to make sago cultivation as part - time work. The practise of having two or more jobs is termed as pluriactivity where farmers earn supplementary income from doing non-farm work when they did not earn enough from farming work (Bessant, 2006). In terms of cultural practice, some smallholders in Indonesia still treat sago cultivation as traditional part-time jobs attending semi-wild tree. (Ahmad, 2014) Consequently, if they don't practice systematic farming, either full-time or part-time smallholders may experience low yield.

There are differences between full - time and part-time operators in terms of work efficiency and motivation. A study found that there is a different farm yield between part - time and full-time farmers where the latter display lower yield (Singh & Williamson, 1981) regarding their farm yield. Therefore, the mode of work is studied in relation to motivation for work. Uddin et al. (2014) compare motivating factors between university students working as part - time employees and full - time employees of Chittagong organizations. The study found that the motivation factors for full - time employees are decent pay, job security and good working conditions. While the motivation factors of the part - time employees are job flexibility, interesting work and a good salary. The difference between the two types is that the first motivation of the full - timers is based on intrinsic factor while the first motivation factors of the part - timers are based on extrinsic factor.

Other critical factors identified in the literature regarding participation in the new millennia's agricultural sector include mechanization, new technology, and training. The Agriculture Entrepreneurship Training Program, which focuses on technology transfer by the Malaysian

Agricultural Research and Development Institute, reports good response and promising participants (Khulidin, 2015). University students view the practice of urban agriculture that makes use of technology positively (Tiraieyari & Krauss, 2018).

Model

The present study's larger research project investigates the young people's intention to increase their participation in the sago industry. The two main components of Reasoned Action Theory, attitudes and subjective norms (Ajzen & Fishbain 1980) are applied as an umbrella model to measure the sago producers' intention. Whilst this sub-research studies constraints factors that serve as the component of disablers of youth participation that limit their involvement in the sago industry (see Figure 1). The constraints factors are developed along the line of subjective norms and attitude paradigm which in the broad layman's term is internal and external factors. Consequently, this study proposes separate survey instrument focusing on constraints factors. Other researches, however, do not separate the negative (constraints) and determinants factors. Nag, Jha, Mohamad & Maiti (2017) developed research instruments that measure rural youths' attitude towards dairying occupation which comprise positive and negative statements of the occupation. Other research that uses a variety of terms similar to constraints including barriers, limitations and challenges. Additionally, Afande, Maina & Maina (2015) conceptualised constraints in agriculture sectors into few attitudes that come from the psychological state of individuals including disinterest, doubt and negative perception. These attitudes are called endogenous factors. Meanwhile, the exogenous factors apply to the individual's external factors.
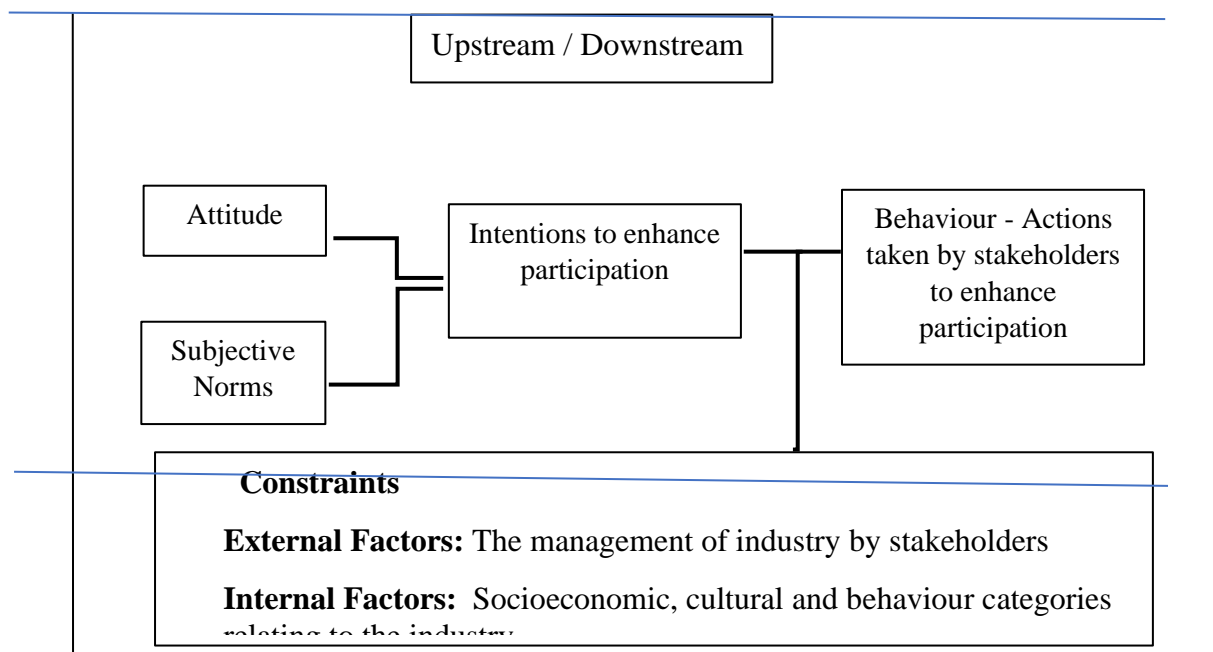

Figure 1: Model adapted from Ajzen and Fishbain (1980)

Method

A quantitative research method is used in this study. For data collection, the survey questionnaire is used to gather the data. The survey was carried out among youth population in three main sago producer districts of Mukah Division. Mukah city centre is approximately

461 kilometers from Kuching, the capital city of Sarawak. The population of Melanau is concentrated in the Mukah division that includes Mukah, Dalat and Daro area and the total population in 2010 is 110,024 (The Official Portal of Sarawak Government, n.d). Youth sample is developed based on their numerous ways of involvement in sago industry; from youth that help the family during the school holiday to youth that works full-time in the industry. Stratified random sampling involves dividing the entire youth population into homogeneous groups called strata. Random samples are then selected from each district to represent the youth population of Mukah. In the case of this study, the number of questionnaires distributed to the youth is determined by the number of areas planted with sago (Dalat 28,169 ha; Mukah 6,472 ha; Matu 4,520 ha and Daro 3,149 ha. (Department of Agriculture of Malaysia, Industrial Crop Statistics Malaysia, 2014). Guided by a specific selection criteria of participants, that is the youths who are actively participating in the sago industry, thus, a total of 200 youths are purposely surveyed. Specifically, out of 200 questionnaires, 100 of them were administered in Dalat, 50 in Mukah and, 25 each for Matu and Daro.

This study is part of a research that includes five main components including one component of constraint factors. A total of 39 statements were prepared to capture factors affecting sago production and respondents were asked to rate their attitude using the five - point Likert scale towards constraints, where 1 is no constraints and 5 is the highest constraints. The validity of the instrument is established where each question is developed on the basis of the researcher's and members ' objective of study and expertise in this research group as most of them had been intensively involved in past socio - economic research sago. The next step is conducting a pilot study, and the outcome is used to refine the final data collection questionnaire. Finally, data collection is carried out with the help of a local research assistant, who is familiar with Melanau people's language and tradition in the Mukah Division.

Firstly, the data is analysed using Statistical Package for Social Science (SPSS) software version 25. Descriptive analysis namely frequencies and percentages were used to describe the socio-demographic characteristics of the respondents in sago industry.

Second, exploratory factor analysis using the principle factor model with varimax rotation was used to determine major dimensions from a wide range of items developed to capture constraints that limit youth participation in the sago industry to better understand the data. Furthermore, varimax rotation method makes the output reliable and Eigenvalues that indicate number > 1 is a reliable value of factor extracted. The technique aims to develop some dimensions of constraints factors. Keiser-Meyer Olkin (KMO) determines the adequacy of the sampling, and 0.6 or higher is considered a meaningful value for factor analysis. Additionally, Bartlett's sphericity test evaluated the hypothesis that the matrix of correlation is an identity matrix that means the items are uncorrelated. The test value ($p<0.05$) is appropriate for an analysis of the factor.

Finally, in this section, logistic regression was employed to predict the models for the participation mode of youth in the sago industry with six constraints variables. The dependent variables were the binary variable, part-time and full-time mode of work. Logistic regression allows dichotomous variables or qualitative response. In addition, this statistical analysis could be used to describe the relationship between several independent variables (six constraints factors). Youth participation is measured as an interval scale and the independent

ones in ordinal scale. The analysis of logistic regression has been applied on part-time and full-time work (Bartoll, Cortès, Artazcoz, 2014) and willingness to plant sago palm (Trisia, 2017). The binary dependent variables were coded with a value of "part-time" = 0 and "full-time" = 1. The Goodness of fit of the model was evaluated using Hosmer-Lemeshow test which was greater than 5 percent level indicating that the mode of youth participation could be explained by the model.

Results and Discussion

Descriptive statistics of frequency and percentages in Table 1 presents a socio-demographic profile of rural youth sago producers (N=200). The largest age group is between 15-20 (43.5%), 21-24 (28.5%) and 25-30 (28%). More male youth respondents compared to female youth (63 to 37%). Respondents who have no formal education (0.5%), primary (24.5%), secondary (52%), pre-university (18.5%) and tertiary (4.5%). Many sago producers of the Melanau community engages in both full-time and part-time jobs. The breakdown of the full time job category of the respondents (N=200) are as follows; schooling (28%), private sectors, including downstream sago jobs (26%); not working full time (25%) public service (10%), sago upstream jobs (8.5%) and self-employed, including downstream jobs (7.5). Whilst, the part-time job category of the respondents (N=200) are as follows; not working as part-timers (52.5%), involved in upstream sago (35%), involved in private sectors, including working in downstream sago (8%) and self-employed, include working in downstream sago (4.5%).

Youth's monthly income is as follows; No income (41%=82), below RM500 (16.5% = 33), RM501-RM1050 (23%=46) and RM1051-RM1500 (14%=28). This indicates that many respondents in this category are dependent on their parents or they are only given a small token whenever they help their parents. In the upstream sector, youth who owned land (1% = 2). The insignificant percentage showed that most of the youth aged 30 and below do not possess the land. They may work as farmers or sago harvester in the family orchard and leased land.

Table 1:

Socio-Demographic Profile of Youth Sago Producers

Variables	Frequency (N200)	Percentage
Age		
15 to 20 year-old	87	43.5
21 to 24 year-old	57	28.5
25 to 30 year old	56	28
Gender		
Male	126	63
Female	74	37
Education Level		
No education	1	0.5
Primary	49	24.5
Secondary	104	52
Pre-Uni	37	18.5
Tertiary	9	4.5
Involvement in sago industry		
Part-time (less than 40 hours per week) Upstream and downstream	167	83.5
Fulltime (more than 41 hours per week) Upstream and downstream	33	16.5
Marital Status		
Single	158	79
Married	42	21

Income		
No income	82	41
below RM500	33	16.5
RM501-RM1050	46	23
RM1051-RM1500	28	14
More than RM1501	11	5.5
Land Ownership		
Owned land	2	1
No land ownership	198	99

Youth participation in sago industry is determined by numbers of working hours per week. The definition of youths' full-time or part-time employment in the sago industry is determined according to the Sarawak Labour Ordinance. Thus, a youth who works less than 41 hours (83.5% = 167) is considered as a part-timer and youth who works more than 41 hours (16.5% =33) is a full-timer in sago industry. This finding indicates that the sago industry is dominated by youths who work part-time. In terms of the type of economic activity, more than half of youth are involved in upstream sectors (58%=116), downstream (19% =38) and youth that participated in both sectors (23%=46).

Table 2:
Working Hours Per Week

Variables	**Frequency (N200)**	**Percentage**
Part-time		
Less than 10 hours	90	45
11 - 20 hours	46	23
21 - 30 hours	22	11
31 - 40 hours	9	4.5
Total	167	83.5
Full-time		
41 - 50 hours	8	4
51 - 60 hours	1	0.5

61 - 70 hours	3	1.5
71 - 80 hours	15	7.5
81 hours and above	6	3
Total	33	16.5
Type of activity		
Upstream	116	58
Downstream	38	19
Both	46	23

Table 3 showed the required reliability tests of exploratory factor analysis technique used for this study which is to examine the constraints factors that influence youth participation in sago industry. The value of Keiser-Meyer Olkin (KMO) was 0.853 which is greater than 0.6, the minimum requirement. Furthermore, Barlett's test of Sphericity showed significant value at $p<0.000$. The significant value acquired from the test is less than 0.05, therefore the constraints items are suitable for factor analysis.

Table 3:
Reliability Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.853	
Bartlett's Test of Sphericity		
Approx. Chi-Square	2470.030	
df	276	
Sig.	0.000	

The result in Table 4 shows 24 items (variables) under six factors that fulfil KMO's criterion in having eigenvalues greater than 1 and are considered significant. The test has reduced the initial items from 38 developed for this study to 24 items. Likewise, initial factors were eight and the test has reduced them to six factors. These factors were renamed (1) Commodity Price (2) New Knowledge (3) Physical Infrastructure (4) Income (5) Assistance (Training). These six factors accumulatively explained 66.873% of the total variation of the constraints factors influencing youth participation in sago industry where the value is acceptable (UCLA, n.d). Items in the six-factor dimensions had factor loadings from the highest 0.843 to the lowest value, 0.59.

Factor 1: Commodity Price. This factor explained about 15.609% of the total variance with eigenvalue of 8.458. The factor comprises six items with the factor loading the highest 0.779 to the lowest 0.617. Participation in upstream and downstream agriculture sectors are limited by commodity price in many ways including high productivity cost compared to low earnings (Najim, et. al, 2007) and fluctuation of the commodity price (Chuangchid, Wiboonpongse, Sriboonchitta & Chaiboonsri, 2012).

Factor 2: New Knowledge. This factor explained about 14.57% of the total variance with eigenvalue of 2.254. The factor comprises six items with the factor loading the highest 0.786 to the lowest 0.603. The constraints in new knowledge refer to lack of communication and lack of exposure in information, innovation and technology. Participation of youth in upstream and downstream agricultural activities can be enhanced by encouraging the use of technology (Shanjeevika, Indumathy & Murugan, 2018).

Factor 3: Physical Infrastructure. This factor explained about 10.826% of total variance with eigenvalue of 1.606. The factor comprises four items with the factor loading the highest 0.741 to the lowest 0.591. The constraints in physical infrastructure are related to the unsuccessful estate plantation program (2 items), unsuitability of soil for sago cultivation and the lack of road to transport sago logs.

Factor 4: Income. This factor explained about 10.448% of total variance with eigenvalue of 1.399. The factor comprises three items with the factor loading the highest 0.837 to the lowest 0.668. The constraints in income refer to lack of sufficiency, stability and income comparison. Income is a significant constraint of youth participation in the agriculture sector (Abdullah, Ahmad & Ayob, 2016).

Factor 5: Assistance. This factor explained about 8.446% of total variance with eigenvalue of 1.185. The factor comprises three items with the factor loading the highest 0.843 to the lowest 0.59. The constraints in assistance refer to a lack of financial aid from government and private and the issue of land ownership.

Factor 6: Training. This factor explained about 7.514% of total variance with eigenvalue of 1.148. The factor comprises two items with the factor loading the highest 0.781 to the lowest 0.684. The constraints in training refer to a lack of interest and opportunity to participate in training.

Table 4:
Factor Analysis

	Component					
	1	2	3	4	5	6
A. COMMODITY PRICE						
G6. Presence of middle man	0.779					
G7. Sago production cost	0.746					
G5. Commodity price	0.743					
G8. Non existence of mechanism that control commodity price	0.663					
G4. Stability of commodity price	0.661					

G29. Own method to increase production	0.617				
B. NEW KNOWLEDGE					
G38. Info communicated by related agencies		0.786			
G37. Use of new equipment		0.709			
G36. Improvising methods of work		0.672			
G34. Seeking info from agencies about innovation		0.662			
G39. Clarity of info from agencies about innovation		0.623			
G33. Availability of new knowledge on sago industry		0.603			
C. PHYSICAL INFRASTRUCTURE					
G17. Output from estate development program SSSED			0.741		
G14. Soil suitability			0.733		
G16. To participate in sago estate development program			0.731		
G19. Availability of road to transport sago logs			0.591		
D. INCOME					
G10. Sufficiency of income from sago				0.837	
G9. Stability of income from sago				0.672	
G11. Income from sago compare to other income				0.668	
E. ASSISTANCE					
G2. Financial aid from the Department of Agriculture					0.843
G3. Financial aid from private bodies					0.738
G13. Land ownership					0.59
F. TRAINING					
G25. Interest to participate in training					0.781

G24. Opportunity to participate in training					0.684

Eigenvalues	8.458	2.254	1.606	1.399	1.185	1.148
% of Variance	15.069	14.57	10.826	10.448	8.446	7.514
Cumulative %	15.069	29.638	40.465	50.913	59.358	66.872
Cronbach's Alpha	0.866	0.829	0.756	0.822	0.81	0.64

The Omnibus Tests Model (Table 5) for the logistic regression analysis was statistically significant X^2 (df=6, N=200) =42.913 p<.001, Cox, and Snell R^2 =0.193 Nagelkerke R^2 = 0.326. The model was 86.5% accurate in its predictions of youth participant mode and type of activity. In Table 6 Hosmer and Lemeshow test results confirmed that the model was a good fit for data, X^2 (df=8, N=200), =3.732, p = .880 Coefficients for the model's predictors are presented in Table 6.

Table 5:
The Omnibus Test Model

	Chi-square	df	Sig.
Step	42.913	6	0.000
Block	42.913	6	0.000
Model	42.913	6	0.000

Results in Table 6 showed that three from six constraints factors; new knowledge, physical infrastructure and training variables improve the predictive ability of the model youth participation mode in sago industry (p<0.05). The Exp (B) coefficient represents the odds ratio, or the change in the probability of the criterion variables occurring (youth participation mode), in relation to predictor variables of constraints factors.

Table 6:
Logistic Regression Part-Time and Full-Time Mode of Work

Variables	β	S.E.	Significance	Odds Ratio [Exp (B)]
Commodity Price	0.038	0.395	0.923	1.039
New Knowledge	1.152	0.428	0.007	3.166
Physical Infrastructure	-1.498	0.519	0.004	0.224
Income	-0.042	0.379	0.913	0.959
Assistance	0.314	0.355	0.375	1.370
Training	-1.277	0.289	0.000	0.279
Constant	2.388	1.559	0.126	10.887
Hosmer- Lemeshow test				
Chi-square	3.732			
Significance	0.880			
Cox and Snell R²	0.193			
Nagelkerke R²	0.326			
Overall predicted percentage correct	83.5			

As Exp(B) is 3.166 for perceived constraints of acquiring new knowledge in sago industry, an increase of 1 unit of the constraints is tied to a significant 216.6% or 2 times (1-3.166 = -2.166) decrease in the odds that youth will participate in working full-time. The remaining predictors, physical infrastructure 77.6% or less than one time (1-.224 =0.776) and training 72.1% (1-.279=0.721) or less than one time decrease in the odds that youth will participate in working full-time respectively.

Discussion
This study found the participation pattern of rural youth sago producers. They are mainly involved in the upstream sector, followed by engagement in both sectors and, lastly, only in downstream. This study also showed that youth who work in the sago industry are mostly part-timers. It is a unique characteristic that has not been found or studied in other crops such as oil palm, paddy and cocoa. Most literature focuses on youth perception regarding agriculture (Tiraieyari & Krauss, 2018) and the determinant factor of youth choice of career in plantation (Abdullah, Ahmad & Ayob (2016). They have worked since a young age by helping their parents as their participation is partly continuing the Melanau culture and family tradition. However, the impact of the part-time modes of work is reported of less yield and land usage is not optimised (Hao, Li & Zhang, 2013; Singh & Williamson, 1981).

This study proposed a constraint model comprises internal and external factors which are developed based on the subjective norms and attitude dimensions of the theory of reason action. The theory came from the social psychology field. In this study, the external factor is related to stakeholders and management of industry and the internal factor is the participant's socioeconomic, cultural and behaviour related to the industry. This model suggested that constraints factor is a standalone empirical research topic. On contrary, the literature in agriculture showed that constraints, challenges and determinants factors are commonly embedded in larger empirical research (Tiraieyari & Krauss, 2018; Nag, et al., 2017; Trisia, Metaragakusuma, Osozawa & Bai, 2017). Additionally, literature in agriculture also showed that some empirical studies on these factors are free from association to any model or theory (Shanjeevika, Indumathy & Murugan, 2018; Abdullah, Ahmad & Ayob, 2016; Agwu, Nwankwo & Anyanwu, 2014).

The logistic regression showed the significant influence of three out of six constraint factors namely new technology, physical infrastructure and training towards full-time participation of youth sago producer in Mukah Division. Rural youth saw a strong significant of new knowledge that disabled their participants. This result is supported by recent research findings (Shanjeevika, Indumathy & Murugan, 2018) where the constraints of rural youth farmers in India is due to the lack of technical skills and training programmes. Research and development (R&D) program that focuses on efficient modern agricultural technology was received very well by Malaysia's youth (Khulidin, 2015). In the new millennia where IR 4.0 has been emphasised, youth depends more on technology and cherish the usage of digital technology in both upstream and downstream agriculture sectors (Trendov, Varas & Meng, 2019). Malaysia has capable agriculture institutions that work for agricultural advances (Borneo Post Online, 2017). However, relevant authorities need to ensure that the availability of technology and training programme focusing on R&D is communicated efficiently to youth (Man, 2012). Additionally, in the era of ICT, rural youth participation in sago industry not only deter by disablers factors of new knowledge and training but also the basic need which is physical infrastructure continuously poses a challenge to them.

Conclusion and Recommendation
This study contributed to the fact that the industry is dominated by the Melanau youth that works as part-timers. Only a few youths have made a full commitment in choosing to work full-time in the sago industry. Therefore, it is suggested that relevant authorities may support other ethnics to involve in the sago industry. Since the literature of youth participation in cash crops' work in Malaysia is mostly on oil palm, this study has contributed to the sago literature on youth participation in the sago industry. Furthermore, the exploratory factor analysis found six constraints factors that deter them from increasing their participation. These factors are commodity price, new knowledge, physical infrastructure, income, assistance and training. The study recommends that rural Melanau youth is mainly in need of the technological advancement in the sago industry. Youth's mode of participation in full time is influenced more than three times by constraint factors of new knowledge, and less than one time for both physical infrastructure and training. The need for new technology, physical infrastructure and training relate to a common issue in the rural area. For expansion of this topic for future study, it is suggested to measure the relationship between mode of participation (as work in sago industry is culturally part-time) and productivity in the upstream

sector. The sago literature shows that productivity is critical because it does not show much progress and it is not known either more participation leads to higher productivity or not.

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