

## **Fragrant rice overview: Benefits and implications of local production**

(Tinjauan industri beras wangi: Faedah dan implikasi pengeluaran tempatan)

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Keywords: cost of production, farmers' acceptance and consumers' preferences, benefits and implications

### **Abstract**

Based on the growing demand for specialty rice, existing policies on paddy and rice industries should be transformed to enable the allocation of growing specialty rice within granary as well as non-granary areas. MARDI has introduced four varieties of fragrant rice known as MRQ 50, MRQ 74, MRQ 76 and MARDI Wangi 88. The cost of production is the vital element that will support the acceptance of farmers to cultivate fragrant rice. Results showed that the total cost of paddy production for MARDI Wangi 88 with subsidies was RM4,335.00/ha, while the cost of non-subsidised production was at RM5,801.05/ha and with the current price of RM1,500, farmers' net income was at RM1,964/ha and RM458.5/ha, respectively. The findings also showed that 87% of the farmers surveyed were willing to cultivate the fragrant rice in their rice fields. As for granary areas, 91% of them were willing to grow the fragrant rice and for the non-granary areas was a bit lower at 82%. Two most preferred varieties were MRQ 76 and MARDI Wangi 88, both at 40.4%. The results from consumers' survey revealed that 78% of them were willing to change their daily intake from white rice to MARDI fragrant rice while 22% still preferred the white rice. As for MARDI's fragrant rice, the most preferred variety was MRQ 76 (30%), followed by MRQ 74 (27%) and MARDI Wangi 88 (21%). These findings indicated a strong signal to further enhance the cultivation of fragrant rice in granary and non-granary areas. The analysis on the benefits and implications also stated that the value of benefits was higher with the terms and conditions applied. Hence, the government policies need to be strengthened on pursuing the growing of fragrant rice in Malaysia. The profit margin analysis should be as a guideline for the industries to estimate their profits and losses. Therefore, in facing future challenges, the subsidy structure and incentives for rice should be scrutinised by the government in order to become a competitive industry.

### **Introduction**

The changes in human lifestyles and socio economic levels have resulted in an increasing demand for specialty rice among Malaysians and the world's population. However, the change in preference to special rice required us to import from a few producing countries to meet local needs.

Most rice granaries in Peninsular Malaysia focused on inbred rice cultivation to meet local white rice demands. Almost the whole of total planted area of 682,118 ha (granary and non-granary) were planted with inbred rice. However, with the current areas and production capacity, the country was still unable to produce enough white rice to meet

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current needs. A major change in paddy and rice policies is required which aims to meet the local demands while exploring the potential to export.

Based on the growing demand for specialty rice, existing policies on paddy and rice industries should be transformed to facilitate the effort of growing specialty rice within granary as well as non-granary areas. As to develop the industries, the value chain from the farmers as producers to consumers needs to be established and streamlined. Farmers' acceptance is an important parameter in order to produce specialty rice, especially fragrant rice. Other parameters such as preference of local consumers towards our own specialty rice should also be considered. Therefore, this paper will overview previous findings from the related studies in order to evaluate the potential of local production as well as consumers preferences and farmers' willingness to plant the local fragrant varieties.

### **Background to rice industry**

The total rice production in 2017 was 2.571 million metric tonnes. This amount of production can supply about 60% of the Malaysian consumption which reached 2,716 million metric tonnes. Therefore, the deficit is filled with importation of rice from world-producing countries, especially from Thailand, Vietnam, Pakistan and Cambodia with total imports of 0.73 million tonnes valued at RM1,314 million by 2017 (Comtrade).

*Table 1* shows the total quantity of Malaysian rice imports according to the type of rice. The average annual growth rate (AGR) was  $-2.54\%$  from 2010 to 2018 which showed a decreasing trend. From 2010 to 2018, the highest import by type was white rice at 80% and the remaining 20% was considered as specialty rice or known as high quality rice (HQR).

The imports of specialty rice were categorised into several types, namely, fragrant rice (16%), glutinous rice (4%), Basmathi (3.3%) and others such as Japonica and red rice (2.6%) (BERNAS 2018). However, HQR had a negative trend with an average growth rate of  $-0.92\%$ . The average growth rate of fragrant rice was the highest (4.54%) with a positive trend compared to other specialty rice such as Basmathi and others which showed a decreasing trend of  $-8.50\%$  and  $-10.28\%$  respectively. The new era of lifestyle changed their daily dietary and socio economic factors which included higher income and living standards, taste preferences and health. These could nowadays make consumers prefer HQR.

### ***MARDI's local varieties of fragrant rice***

In the past 20 years, MARDI has introduced four varieties of fragrant rice known as MRQ 50, MRQ 74, MRQ 76 and MARDI Wangi 88. The introduced varieties had different characteristics with the objective of increasing the productivity of local fragrant rice as well as to reduce the country's dependency on imported rice. The first variety (MRQ 50) was launched by MARDI in 1999. The second variety (MRQ 74) also known as Mas Wangi was launched in 2005. This variety was more to a Basmathi type of rice and characterised as a healthy food specifically for diabetic patients. The third variety (MRQ 76) which had the same features and comparable to the pure Siamese rice, was launched in 2011. The latest variety (MARDI Wangi 88) launched in 2016 was promoted as a flavoured Malaysian rice especially among consumers who preferred soft medium rice (Mohamad Najib et al. 2016).

Table 1. Total Malaysian rice imports by type of rice (tonnes)

Year/Type of rice	Fragrant rice	Basmathi rice	White rice	Others rice	Total	Total specialty rice (HQR)
2010	83,946	49,919	754,407	44,170	932,442	178,035
2011	73,123	21,259	919,311	47,113	1,060,806	141,495
2012	107,607	28,084	816,148	26,783	978,622	162,474
2013	120,002	30,718	658,331	38,035	847,086	188,755
2014	97,273	26,529	707,440	53,058	884,300	176,860
2015	105,600	28,300	768,000	57,600	960,000	191,500
2016	107,786	16,129	578,318	14,872	717,104	138,787
2017	114,839	36,136	527,535	16,800	695,310	167,775
2018	120,749	25,282	595,779	19,412	761,223	165,443
AGR (%) (2010 – 2018)	4.54	- 8.50	- 2.95	- 10.28	- 2.54	- 0.92

Source: BERNAS and MOA (2018)

### Methodology

This paper evaluated the overview of the specialty rice industry in Malaysia focusing on the fragrant rice. It will include the cost of production, farmer's acceptance on planting the fragrance rice as well as consumers' preference towards MARDI's fragrance rice. The partial budgeting technique was used to determine the benefits and implications on the decision making of either to locally produce fragrance rice or continue to import to meet consumers' demands. Primary data was collected in 2018 using purposive sampling such as millers, farmers as well as the Department of Agriculture (DOA) and statistical department for secondary data. The margin analysis was done to model the estimated profit margin for each player along the value chain.

### Overview of the findings

Local aromatic rice production is expected to reduce the import of fragrant rice from neighbouring countries such as Thailand and Vietnam. Hence, the acceptance of our farmers to cultivate this fragrant rice is crucial to ensure that the government's goal of reducing imports will be achieved as well as exploring the potential for export. The study of acceptance of MRQ 74 was once conducted by Jamal et al. (2014) on

70 farmers in the non-granary areas. This study identified the variety's characteristics, suitability and easy to care, willingness towards the planting of fragrant rice as well as social demographics profiles of the farmers to be the important factors considered by the farmers in order to accept the cultivation of fragrant rice.

A study by Wong et al. (1992) and Syahrin et al. (2014) indicated that Malaysian consumers mostly preferred rice that had more head rice, lower amylose content and long grains. Other studies concluded that the most important attributes of rice consumption was food safety, taste and size of grain (Ahmad Hanis et al. 2012). Syahrin et al. (2008) found that 79% of the respondents who consumed white rice were willing to change their preference towards MARDI's fragrant Basmathi type rice, which was non-sticky and had low starch. Hence, this could be a substitute to imported Basmathi and Ponni rice. Consumers were also willing to pay a premium price for the demanded attributes. Hence, HQR needs to fulfil the characteristics and attributes that consumers preferred to make sure that the specialty rice is able to gain market access at a premium price.

### **Cost of production of MARDI fragrant rice**

To ensure the viability of planting the fragrant rice, costs and benefits were calculated from a farmer involved with MARDI's up-scaling plots at Alor Sekawan and Kota Sarang Semut in Kedah. The total yield of MARDI Wangi 88 rice was 5.25 mt/ha with a gross income of RM6,300/ha earned by farmers after a deduction of 20%. Compared to the inbred, the deduction was much higher at 25% which showed a similar gross income for both varieties (Rosnani et al. 2017). It also showed that the total cost of paddy production for MARDI Wangi 88 with subsidies was RM4,335.50/ha, while the cost of non-subsidised production was at RM5,801.50/ha and with the current price of RM1,500, farmers net income was at RM1,964.50/ha and RM458.50/ha, respectively. If the fragrant rice was not subsidised in terms of inputs, the higher farm price should be considered. Government can subsidise in terms of price subsidy at RM300/mt while millers paid RM1,500/mt as a farm price. If it is so, the net income of the farmers can increase to RM1,758.95. The benefit cost ratio (BCR) for fragrant rice was a bit lower at 1.45 as compared to white rice at 1.51. The BCR still showed a good indicator at 1.09 even though without any intervention from the government. However, it was considered as a low profit for the farmers.

The cost of production and income of paddy cultivation on a regular basis can be referred to in *Table 2*.

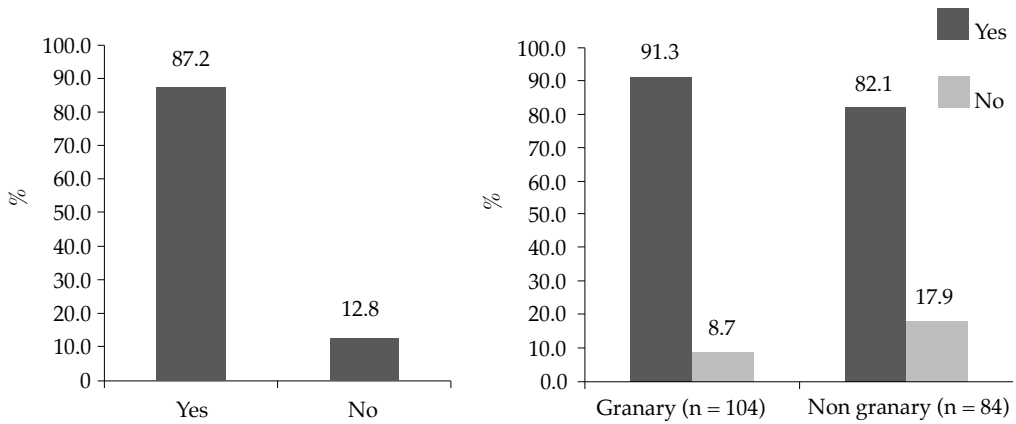
### **Farmer's acceptance towards planting fragrant rice**

Previous studies found that farmers were willing to cultivate MARDI's fragrant rice variety. The findings showed that 87% of the respondents were willing to cultivate the fragrant rice in their rice fields. As for granary areas, 91% of respondents were willing to grow the fragrant rice, whereas for the non-granary areas the percentage was a bit lower (82%) (*Figure 1*). The two most preferred varieties were MRQ 76 and MARDI Wangi 88 at 40.4% for both. Logistic regression analysis was done to identify factors that influenced the farmers to cultivate fragrant rice. Areas, land ownership and farmers experience significantly influenced the farmer's decision on planting the fragrant rice (*Table 3*). However, the adjusted R<sup>2</sup> was at 0.23 which implied that 23% of these factors contributed to the farmer's acceptance level, while the remaining 77% was influenced by external factors. Majority of the farmers still received the subsidy (96%) and preferred suitable mills for processing purposes (Rosnani et al. 2017).

Table 2. Summary of production cost and revenue of MARDI white rice and fragrant rice

Cost and revenue	Inbred with subsidy	MARDI Wangi 88		
		With input subsidy	Without subsidy	With price subsidy
Gross production (mt/ha)	5.60	5.25	5.25	5.25
Gross income (RM/ha)	6,300.00	6,300.00	6,300.00	7,560.00
Input cost (RM/ha)	285.50	467.50	1,833.50	1,833.50
Operational cost (RM/ha)	3,897.50	3,868.00	3,968.00	3,968.00
Total cost (RM)	4,183.00	4,335.50	5,801.50	5,801.50
Cost/mt (RM)	746.96	825.81	1,105.05	1,105.05
Net income (RM/ha)	2,117.00	1,964.50	458.50	1,758.95
Benefit Cost Ratio (BCR)	1.51	1.45	1.09	1.30

Source: *Buku Laporan Kajian Sosio Ekonomi* (2017)



Source: *Laporan Kajian Sosio Ekonomi* (2017)

Figure 1. Farmers level of acceptance – overall and by type of granary

Table 3. Factors that influenced the farmers to plant MARDI’s variety (n = 188)

Parameter	Coefficient (β)	Standard error	p value
Gender (1 = Male; 0 = Female)	.744	.700	.288
Area (1 = granary; 0 = non-granary)	-1.352*	.572	.018
Experience	-.033*	.016	.044
Land status (1 = owned; 0 = others)	.906	.560	.106
Land status (1 = lease; 0 = others)	1.490*	.613	.015
Production	-.154	.111	.167
Capitol per season	-.00003	.000	.151
Farmers category (1 = individual; 0 = others)	-.058	.617	.925
Constant	3.747	1.623	.021

$\chi^2$  test = 11.65 ( $p > \chi^2 = 0.005$ ); \* significant at  $\alpha = 5\%$ ; Nagelkerke  $R^2 = 0.232$ ;  
-2 log likelihood = 129.0

Source: *Laporan Kajian Sosio Ekonomi* (2017)

**Perception of local consumers towards MARDI’s varieties**

White rice is a staple food for most of our population. However, changing lifestyle for a healthy meal may change our consumers’ preferences towards rice. Surveys were conducted to identify consumers’ preferences on local specialty rice as compared to imported rice. A survey done in 2017 (Figure 2) showed that Malaysian consumers equally consumed either white

rice or specialty rice in their daily intake. Results showed that 48.25% consumed white rice, 45.25% consumed specialty rice while the remaining consumed others (6.5%). For specialty rice, 21% bought fragrant rice, 11.25% bought Basmathi rice, 11% bought both Basmathi and fragrant rice, 1.75% bought brown rice while the remaining bought organic rice (0.25%).

Sensory survey was also done to identify the percentage of fragrant rice

consumers were willing to buy among our local varieties (MRQ 74, MRQ 76 and MARDI Wangi 88) as well as the most preferred fragrant rice produced locally or imported (Figure 3). The results showed that 78% consumers were willing to change their daily intake of rice to MARDI fragrant rice while 22% preferred white rice. The most preferred local variety was MRQ 76 (30%), followed by MRQ 74 (27%) and MARDI Wangi 88 (21%). As for imported vs local variety, consumers preferred the local variety due to its characteristics such as whiteness and softness which showed higher mean scores.

**The consumer willingness to pay for fragrant rice**

Syahrin et al. (2013) did a study on the consumers' perception and acceptance of specialty rice. Two types of varieties were considered, MRQ 74 and MRQ 76, which were identified as equal in quality with imported fragrant rice in Malaysia. The results showed that most of the consumers were satisfied with the softness (91.7%), fragrance during cooking (82.5%), health value (90.5%), prolonged shelf life (87.7%) and good quality (71.6%). Other characteristics such as length of the rice and stickiness (52.6% and 50.71% respectively) were not considered as important characters. By using the regression model, the retail price of MRQ 76 was proposed at RM6.20/kg while for MRQ 74 was a bit lower at RM5.51/kg. These prices could be used as a guideline for millers and wholesalers to calculate the cost of production that can profit all parties.

**Partial budgeting**

Based on the above reviewed papers, the production of fragrant rice might be an opportunity to re-structure the rice industry as a new source of income for the country. However, if the fragrant rice is promoted to the farmers, the implications and the benefits of the activities should be evaluated.

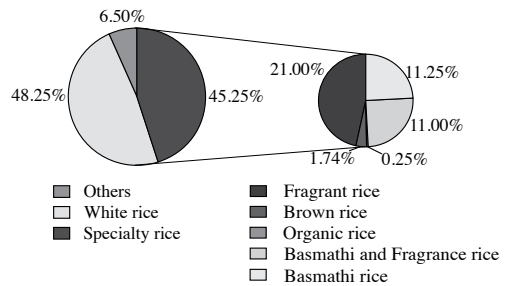


Figure 2. Daily rice consumption category

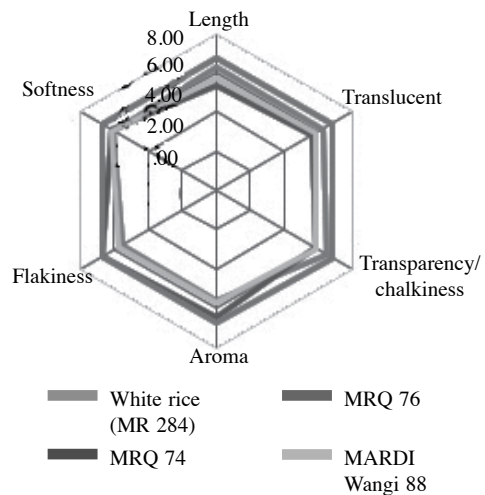


Figure 3. Fragrant rice characteristics preferred by consumers

Therefore, the partial budgeting analysis was conducted to evaluate the benefits and implications of planting the fragrant rice locally. Primary data was collected using purposive sampling and secondary data was from related agencies. The analysis was based on the assumption as shown below:

1. To produce fragrant rice of 105,560 mt, the total area converted from white rice was estimated at 16,245.15 ha per season
2. The white rice was assumed to produce in average at 5.5mt/ha while the fragrant rice was at 5mt/ha

The partial budgeting was done based on 2 assumptions:

1. Government continued with the input subsidy at RM1,466/ha and millers will buy at a price of RM1,500/mt. Government is not giving the price subsidy.
2. Government continued with the price subsidy at RM300/mt and millers will buy at a price of RM1,500/mt. The price of the fragrant rice at farm level was at RM1,800/mt.

According to *Table 4*, the partial budgeting analysis was based on the first assumption. If the government continued to subsidise the inputs, the expenses remained as it is; no implications to the government budget. Millers needed an extra budget of RM300 as the farm price of fragrant rice was proposed at RM1,500. Other implications to millers were that they had to renovate the milling line in order to fit the fragrant rice processed. By planting more fragrant rice, production of white rice will reduce and that will cause importing more white rice to replace the deficit production. In contrast, we gain benefits for not importing fragrant rice. The value of benefits stated that it was more than implications which implied the significance of planting the fragrant rice locally.

As can be seen from *Table 5*, the government continued to subsidise the price mechanism whilst input subsidy was out of the frame. The results also showed more benefits gained due to lower implication cost incurred on price subsidy as compared to input subsidy. The benefits were higher at RM166.55 million. This could be happening whenever the farmers were cultivating the fragrant rice (with a secured market) followed by the elimination of the input subsidy.

Demand is in an increasing trend, and in the future, the importance might parallel with the white rice. The results in previous findings on the acceptance of farmers do support the planted of fragrant rice at the granary area as well as non-granary. On the other hand, the government would also gain

the monetary benefits by reducing the price subsidy. However, the policy implementation by the government to support the industry should be strong in order to strengthen the whole rice and paddy industry.

### ***Profit margin analysis***

The millers will be the main players who will be paid for the extra RM300/mt for both options. As millers had to pay a higher price, the price for other players might change as well to bare the higher cost of production. The profit margin analysis was done as a guideline to the industry players to optimise the price at the level of wholesalers and retailers.

At the moment, the price for local fragrant rice was at RM5/kg and the retailers profit was estimated at 11.1%. Farmers were more affected by the subsidy compared to others. If the government continues the input subsidy scheme, it will cause the dedicated funds to remain as government expenditure, although the policy stated that specialty rice was not being subsidised. In terms of farmers' benefits, there will be an increase in the farmers' income as highlighted in *Figure 4*. The profit margin for farmers was at 80.7%, while other players in the industry such as millers, wholesalers and retailers will gain profit margins at 23.8%, 20.1% and 24% respectively.

For option 2, the government subsidised the price for RM300, so that farmers will receive the price of RM1,800/mt at the millers (*Figure 5*). Farmers' profit margin will be less at 62.1%, but government expenditure will be less. Other players remain the same. As it was discussed earlier in partial budgeting analysis, this option will be good to be implemented as a win-win situation for both parties i.e. the farmers and the government. Therefore, the paddy and rice industries should be transformed in order to sustain as well as secure our food security agenda.

Table 4. Partial budgeting analysis (with input subsidy)

Benefits	Value in RM (mil)	Implications	Value in RM (mil)
<i>Revenue increased</i>		<i>Revenue decreased</i>	
Production of fragrant rice	174.23	Production of white rice	139.39
<i>Cost decreased</i>		<i>Cost increased</i>	
White rice price subsidy (RM300/mt)	34.84	Millers (RM300/tan)	31.67
Imports value for fragrant rice	321.02	Millers (depreciation cost)	13.84
		Imports value for white rice	191.43
	530.09		376.33
Benefits – Implication	153.76		

Source: EPP9

Table 5. Partial budgeting analysis (with price subsidy)

Benefits	Value in RM (mil)	Implications	Value in RM (mil)
<i>Revenue increase</i>		<i>Revenue decreased</i>	
Production of fragrant rice	174.23	Production of white rice	139.39
<i>Cost decreased</i>		<i>Cost increased</i>	
Government subsidy for inputs (RM1466/ha)	47.63	Millers (RM300/tan)	31.67
Imports value for fragrant rice	321.02	Millers (depreciation)	13.84
		Imports value for white rice	191.43
	542.88		376.33
Benefits – Implications	166.55		

Source: EPP9

### Conclusions and recommendations

The structure of the rice and paddy industries in Malaysia should be applied for both parties in order to sustain the industry. As farmers are willing to plant the fragrant rice, the value chain should be in place as well as the product quality control. The estimated willingness to pay from the consumers should be a benchmark as product quality control where consumers' expectations were at least not less than the premium fragrant rice in the market. In facing future challenges, the structure of subsidies and incentives for rice need to be scrutinised by the government. The status quo of assistances throughout the

decades did not really cause a significant change either in the performance of industries or in the standard of living of the farmers. It is timely for the change towards less dependability of the farmers on the assistances from the government. The creation of premium segments such as specialty rice is considerably a step in liberalising the industry which in turn could trigger a more competitive environment and indirectly encourage the stakeholders to involve in technological transfers.

In terms of government savings, with price subsidy it will more beneficial as compared to input subsidy. This could also attract the farmers to plant fragrant rice



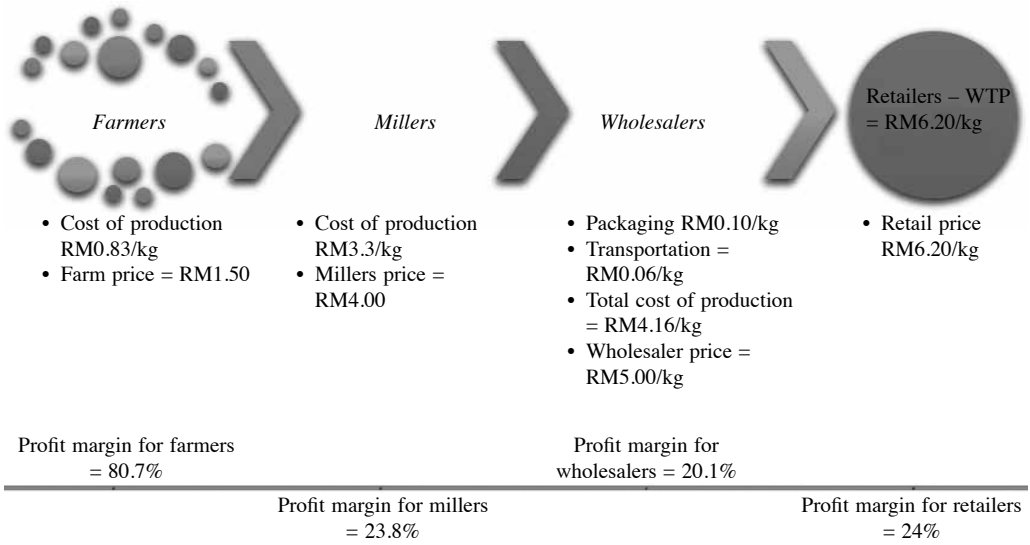


Figure 4. With input subsidy

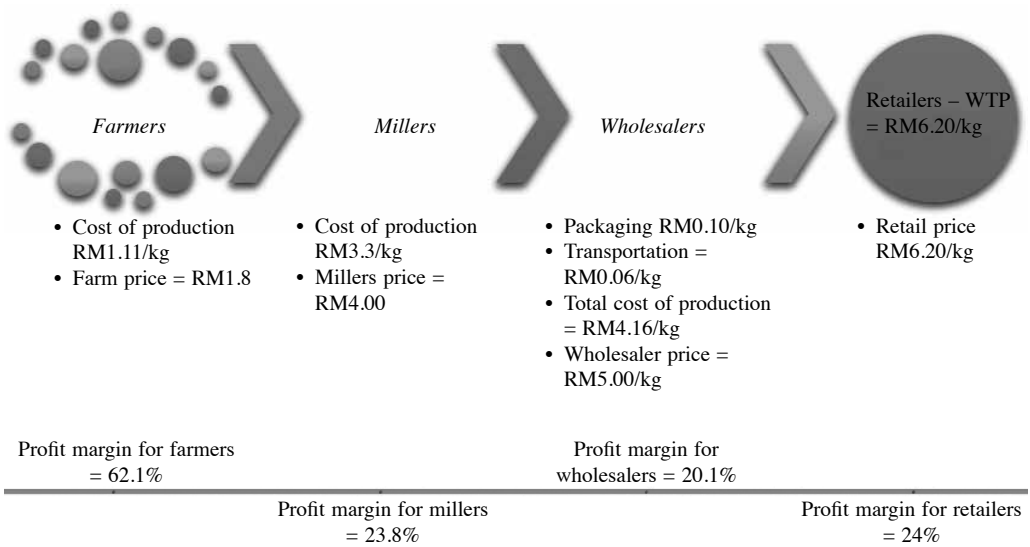


Figure 5. With price subsidy

due to higher farm prices. However, if we compared the profit margins, farmers get better margins with the inputs subsidy given. The study showed that the guidelines for fragrant rice retail prices were in the range of RM5.51/kg to RM6.20/kg depending on the varieties and quality. This could be as a guideline to policy makers for making a new direction for the rice and paddy industry. Our paddy and rice industry was heavily relying on the subsidy to sustain. Our white rice alone is not capable of sustaining the industry. Planting more specialty rice might be a good booster for the industry in the future.

The domestic market for fragrant rice might not be as wide as for the common white rice. However, the demand is likely forever due to its importance as a staple food, considerably as food security as well. There is a market segment among the locals which is steadily increasing, especially with the increasing awareness for a healthy lifestyle. As far as rice is our staple, the needs of securing the food is always a priority. The fragrant or specialty rice needs to grow as a niche market.

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### **Abstrak**

Berdasarkan permintaan yang semakin meningkat khususnya beras istimewa, polisi dasar sedia ada mengenai industri padi dan beras negara harus diubah dengan membolehkan beras istimewa, terutamanya beras wangi untuk ditanam di kawasan jelapang dan juga di luar kawasan jelapang. MARDI telah memperkenalkan empat jenis beras wangi yang dikenali sebagai MRQ 50, MRQ 74, MRQ 76 dan MARDI Wangi 88. Kos pengeluaran adalah elemen penting yang akan menyokong penerimaan petani untuk menanam padi wangi. Keputusan menunjukkan kos pengeluaran bagi varieti MARDI Wangi 88 dengan subsidi adalah RM4,335.00/ha, manakala tanpa subsidi ialah sebanyak RM5,801.05/ha dan dengan harga semasa iaitu RM1,500/mt, purata pendapatan bersih yang akan diperolehi oleh petani adalah RM1,964/ha dan RM458.50/ha masing-masing. Hasil kajian menunjukkan bahawa 87% petani sanggup untuk menukar dari penanaman padi putih kepada padi wangi di sawah mereka. Bagi kawasan jelapang, 91% responden sanggup menanam padi wangi manakala di luar kawasan jelapang, peratusan adalah lebih rendah iaitu 82%. Dua jenis varieti yang paling digemari untuk ditanam ialah MRQ 76 dan MARDI Wangi 88, kedua-duanya pada 40.4%. Di pihak pengguna, kajian yang dijalankan menunjukkan bahawa 78% pengguna sanggup mengubah pengambilan beras harian mereka ke beras wangi MARDI manakala 22% kekal dengan penggunaan beras putih. Pengguna paling menyukai MRQ 76 (30%), diikuti oleh MRQ 74 (27%) dan MARDI Wangi 88 (21%). Analisis mengenai faedah dan implikasi juga menunjukkan nilai manfaat yang lebih tinggi dengan terma dan syarat yang digunakan. Justeru itu, dasar kerajaan perlu diperkukuhkan bagi meneruskan penanaman beras wangi di Malaysia. Analisis margin keuntungan boleh digunakan sebagai garis panduan bagi industri untuk menganggarkan keuntungan dan kerugian mereka. Oleh itu, bagi menghadapi cabaran masa depan, struktur subsidi dan insentif untuk beras wangi perlu diteliti oleh kerajaan supaya ia menjadi industri yang kompetitif.

