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Star River Case Analysis

Initial Assessment: An initial look at the ratio analysis reveals that the annual sales-growth rate has been holding around 15%. This is perhaps the only good news from the analysis. A performance discontinuity makes its appearance in FY 2000 as a drop in operating margin. This was a result of a 21% increase in production costs and expenses and a 20% increase in admin and selling expenses. There was also an inexplicable 95% increase in inventory. This jump in inventory and operating expenses appears to have been financed through debt, as the debt/equity and debt/total capital ratios increased during this period. Since the sales growth rate has held steady, there has been no draw down on the excess inventory, thus tying up considerable capital.

The ratio analysis also shows that both the current and quick ratios indicate that there may be cash-flow problems in the near future. The company appears to be experiencing a sharp reduction in efficiency, and to be financing that inefficiency through debt.

Financial Forecast: The financial forecast for FYs 2002 and 2003 are shown in Appendix A. These were forecast using the percent-of-sales method, averaging the most recent two years to provide the primary ratios, with a few exceptions. This forecast shows that while maintaining the current levels of operating efficiency, depreciation of existing equipment, and purchasing the new DVD equipment will require additional funds on the order of SGD 11M for 2002 and a further 25M in 2003. This means that Star River cannot pay off its loan in a reasonable period. Sensitivity analysis shows that, while maintaining the current sales growth rate of 15%, the need for additional funds in 2002 is 2003 are relatively insensitive to operating expenses, requiring that operating expenses, as a percentage of sales, be reduced from 50% to below 40% in 2002, and reduced further in 2003, in order to avoid the need for additional financing.

Further sensitivity analysis shows that inventory levels **are** a significant driver of additional funds needed. Currently, inventory levels are maintained at almost 60% of sales, and at these levels the forecast and sensitivity analysis reveals that additional funds will be needed for both of the next two years. If inventory levels were reduced to their 1998/9 level of approximately 34% of sales then there would be a surplus of SGD 22M in 2002 and 14M in 2003. For this reason, management should focus on reducing inventory levels.

WACC: Since Star River is privately held, determining the WACC requires making certain assumptions. Analysis of similar firms reveals that *Wintronics, Inc.* is most similar to Star River. It is in the same industry and has a similar expected growth rate, but is about five times as large in terms of book value of equity. Using the current Singapore 10-year T-bond rate of 3.6%, the current market risk premium of 6%, and *Wintronics'* beta of 1.52 we arrive at a required return on equity, for *Wintronics*, of 12.7%. Since Star River is privately held it seems reasonable to add a liquidity premium. I chose to add a 2% liquidity premium due to the risk associated with this troubled company, thus bringing the required rate on Star River equity to 14.7%.

The market value of equity was calculated using both the Free Cash Flow to Equity (FCFE) method and the M/B ratio for *Wintronics*. Since WACC is used for forward-looking evaluation, the valuation is based on the 2002 forecast of FCFE (5,683), and the forecast equity growth rate of 8.8% (calculated using forecast ROE * Retention Ratio). This results in an estimated market value of equity of SGD393.2M. Using the M/B ratio from *Wintronics* (4.4) and the current book value of equity (47M) we reach a market value of equity of 205.7M. Due to the company's issues I am using the lower valuation.

The market value of debt was calculated using the yield to maturity on the existing privately-placed bond of June 1, 2000. With the 5.75% semi-annual coupon and the discount price of 97, the YTM on this bond is 6.62%. With these rates, the market value of Star River's total long-term debt, as of 2001, is 17.7M.

With the bond's face value of 100 and its sale price of 97, I assumed a 3% flotation cost. Using the bonds required coupon rate of 6.46%, 3% flotation costs, and Star River's tax rate, the after tax cost of debt comes to 5.43%. The WACC calculation is detailed in the following table.

Weighted Average Cost of Capital (Wintronics M/B)				
Component	**Market**	**Weight**	**Cost**	**Component cost**
Equity	205,723	92.1%	14.7%	13.56%
Debt	17,654	7.9%	5.55%	0.44%
Market Values	223,377	100.0%	**WACC:**	**13.99%**

As shown above, the estimated WACC for Star River is 14%.

While 14% is the best estimate, there are certain sensitivities that must be noted. Since the majority of the capital is from equity, anything that affects either the weight or cost of equity will have a significant impact on WACC. The two most influential inputs are the beta and the liquidity premium. The following table shows various WACC values as the beta is varied from 1.40 through 1.67, and the liquidity premium is varied from 0% through 3%.

WACC: Beta v LP	13.99%	1.40	1.50	1.52	1.60	1.67
Rows are beta	0.0%	11.49%	12.04%	12.15%	12.60%	12.98%
Column is LP	1.0%	12.41%	12.96%	13.07%	13.52%	13.90%
	2.0%	13.33%	13.88%	**13.99%**	14.44%	14.82%
	3.0%	14.25%	14.81%	14.92%	15.36%	15.74%

For the remainder of the report, WACC is assumed to be 14%.

Packaging Machine Replacement Analysis: The plant foreman has expressed concern regarding the unreliability of the current packaging machine, and urged the purchase of a replacement. Due to production limits on the current equipment, Star River will have to purchase the new equipment in three years in order to keep up with forecast production levels. This analysis requires forecasting the two projects for 13 years, and is thus fraught with the issues associated with such a long-term forecast. These issues include (but are not limited to) unexpected changes in the inflation and interest rates, labor costs, and the required rate of return on equity. Nevertheless, the details of this analysis are documented in Appendix B.

Relevant assumptions include the inflation rate, the increasing price of the new machine and associated maintenance contract, the differential labor costs associated with operating the current machine verses the new machine, and of course the Weighted Average Cost of Capital.

Financial analysis of the net cash flows (shown below) discounted at the estimated WACC of 14% indicate that even with expected inflation and the increased price of the machine in the future, we should wait on this purchase until 2005.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
FCF (Buy Now)	(1,661,360)	(7,111)	(7,987)	(8,882)	(9,795)	(10,728)	(11,680)	(12,653)	(13,647)	(14,663)	(60,291)	(61,352)	(62,437)
FCF (Buy Later)	(55,678)	(56,781)	(57,900)	(2,108,731)	(2,767)	(3,699)	(4,652)	(5,625)	(6,619)	(7,634)	(8,672)	(9,734)	(10,818)
NPV (Buy Now)	(1,539,148)												
NPV (Buy Later)	(1,397,480)												
Difference	(141,668)												
Decision	Buy Later												

This decision is primarily sensitive to the WACC, so I did a crossover rate analysis. This analysis indicates that postponing the purchase remains the financially-correct decision with WACC rates above 9.5%. Earlier analysis reveals that it is unlikely that our WACC could fall below this rate so the decision is sound even with a significant change in WACC. Additionally, sensitivity

analysis of this decision with respect to maintenance and labor costs indicates that even with a simultaneous 20% increase in both costs, postponing is still the financially correct decision.

In addition to the cash-flow aspects of this decision, there are other aspects whose financial implications are difficult to forecast but that should nevertheless be considered. In particular, low morale in the production department due to the expected high over time requirements for the next three years could increase the turnover rate in that department. If we were to lose key people in this department we may find ourselves facing both an outdated and unreliable packaging machine and a lack of people experienced in repairing it and keeping it running. Recreating this experience while maintaining the necessary near-peak output from the machine is likely to cause missed shipments to customers, damage to our reputation in the industry, and potential loss of repeat business. It is also well-documented that sustained overtime operations result in higher accident rates and thus higher medical insurance premiums.

The Net Present Value of purchasing the machine now is 142,000 greater than delaying the purchase. It is not clear if the potential damage to employee morale, industry reputation, and the potential loss of customers warrants the risks associated with delaying the purchase.

Appendix A: Financial Forecast for FY 2002 and 2003

Assumptions	
Income Statement	
Sales Growth Rate	15.0%
Prod Cost as % of sales	50.3%
SG&A as % of sales	22.9%
Tax Rate	24.5%
Dividends	2,000
Balance Sheet	
Cash as % of Sales	6.0%
A/R as % of Sales	31.9%
Inventory as % of Sales	59.1%
Depr (existing) as % of net PP&E	14.1%
A/P as % of Sales	12.7%
Other accrued liab	23.6%
Debt	
Singapore prime lending rate	5.20%
Interest Rate (short-term)	6.70%
Interest rate (long-term)	6.62%

*** All amounts are in SGD 000**	Historical				% Sales	Pro Forma	
	1998	1999	2000	2001		2002	2003
Sales	71,924	80,115	92,613	106,042	15.0%	121,948	140,241
Operating expenses:							
Prod. costs and exp.	33,703	38,393	46,492	53,445	50.3%	61,340	70,541
GS&A	16,733	17,787	21,301	24,177	22.9%	27,926	32,115
Depr. Exp.	8,076	9,028	10,392	11,360		13,791	16,465
Total Op. Exp.	58,512	65,208	78,185	88,983		103,057	119,121
Operating profit	13,412	14,908	14,429	17,059		18,891	21,119
Interst expense	5,464	6,010	7,938	7,818		7,604	8,561
Earnings before taxes	7,949	8,897	6,491	9,241		11,287	12,558
Income taxes	2,221	2,322	1,601	2,093	24.5%	2,765	3,077
Net earnings	5,728	6,576	4,889	7,148		8,522	9,481
Dividends	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Retentions of earnings	3,728	4,576	2,889	5,148		6,522	7,481

	Historical				% Sales	Pro Forma	
	1998	1999	2000	2001		2002	2003
Assets:							
Cash	4,816	5,670	6,090	5,795	6.0%	7,342	8,443
Accounts receivable	22,148	25,364	28,078	35,486	31.9%	38,890	44,724
Inventories	23,301	27,662	53,828	63,778	59.1%	72,108	82,924
Total current assets	50,265	58,697	87,996	105,059		118,340	136,091
Gross PP&E	64,611	80,153	97,899	115,153		142,453	169,753
Accum. Depr.	(4,559)	(13,587)	(23,979)	(35,339)		(49,130)	(65,595)
Net PP&E	60,052	66,566	73,290	79,814		93,323	104,158
Total assets	**110,317**	**125,262**	**161,916**	**184,873**		**211,663**	**240,249**
Liabilities Equity:							
Short-term borrowings	29,002	37,160	73,089	84,981	>>>	84,981	84,981
Accounts payable	12,315	12,806	11,890	13,370	12.7%	15,516	17,843
Other accrued liabilities	24,608	26,330	25,081	21,318	23.6%	28,771	33,086
Total current liabilities	65,926	76,296	110,060	119,669		129,267	135,910
Long-term debt	10,000	10,000	10,000	18,200		18,200	18,200
New Debt					Plug	10,670	25,131
Shareholders' equity	34,391	38,967	41,856	47,004		53,526	61,007
Total liabilities and equity	**110,317**	**125,263**	**161,916**	**184,873**		**211,663**	**240,249**

Appendix B: Analysis of Replacement of Packaging Machine

Assumptions	
Inflation	1.50%
Tax Rate	24.50%
Cost of Capital	13.99%
Current Machine	
Annual Maint.	(15,470)
Op. Labor (regular Time)	(63,700)
Op. Labor (overtime)	(81,900)
Book Value (at start of 2002)	218,400
Depr. Years Remaining	3
Book Value	218,400
New Machine	
Price (2002)	(1,820,000)
Depr. Years Remaining	10
Maint. Contract (2002)	(3,640)
Price & Maint. growth rate	5.0%

Scenario: Buy Now

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
New Machine													
Purchase	(1,820,000)												
Maint. Exp.	(3,640)	(3,822)	(4,013)	(4,214)	(4,424)	(4,646)	(4,878)	(5,122)	(5,378)	(5,647)	(5,929)	(6,226)	(6,537)
Op. Labor	(63,700)	(64,656)	(65,625)	(66,610)	(67,609)	(68,623)	(69,652)	(70,697)	(71,758)	(72,834)	(73,926)	(75,035)	(76,161)
Depreciation Exp.	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	(182,000)	0	0	0
Total Exp.	(249,340)	(250,478)	(251,638)	(252,823)	(254,033)	(255,269)	(256,530)	(257,819)	(259,136)	(260,481)	(79,856)	(81,261)	(82,698)
Total exp. After tax	(188,252)	(189,111)	(189,987)	(190,882)	(191,795)	(192,728)	(193,680)	(194,653)	(195,647)	(196,663)	(60,291)	(61,352)	(62,437)
Sell old machine	164,892												
Add Back Depreciation	182,000	182,000	182,000	182,000	182,000	182,000	182,000	182,000	182,000	182,000	0	0	0
Op. Cash Flow	158,640	(7,111)	(7,987)	(8,882)	(9,795)	(10,728)	(11,680)	(12,653)	(13,647)	(14,663)	(60,291)	(61,352)	(62,437)
Free Cash Flow	(1,661,360)	(7,111)	(7,987)	(8,882)	(9,795)	(10,728)	(11,680)	(12,653)	(13,647)	(14,663)	(60,291)	(61,352)	(62,437)
NPV	**(1,539,148)**												

Scenario: Buy in three years

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Current Machine													
Maint. Exp.	(15,470)	(15,702)	(15,938)										
Op. Labor	(81,900)	(83,129)	(84,375)										
Depreciation Exp.	(72,800)	(72,800)	(72,800)										
Total Exp.	(170,170)	(171,631)	(173,113)										
Total exp. After tax	(128,478)	(129,581)	(130,700)										
Add Back Depreciation	72,800	72,800	72,800										
Cash Flow	(55,678)	(56,781)	(57,900)										
New Machine													
Purchase				(2,106,878)									
Maint. Exp.				(4,214)	(4,424)	(4,646)	(4,878)	(5,122)	(5,378)	(5,647)	(5,929)	(6,226)	(6,537)
Op. Labor				(66,610)	(67,609)	(68,623)	(69,652)	(70,697)	(71,758)	(72,834)	(73,926)	(75,035)	(76,161)
Depreciation Exp.				(210,688)	(210,688)	(210,688)	(210,688)	(210,688)	(210,688)	(210,688)	(210,688)	(210,688)	(210,688)
Total Exp.				(281,511)	(282,721)	(283,956)	(285,218)	(286,507)	(287,823)	(289,169)	(290,543)	(291,949)	(293,386)
Total exp. After tax				(212,541)	(213,454)	(214,387)	(215,340)	(216,313)	(217,307)	(218,322)	(219,360)	(220,421)	(221,506)
Add Back Depreciation				210,688	210,688	210,688	210,688	210,688	210,688	210,688	210,688	210,688	210,688
Op. Cash Flow				(1,853)	(2,767)	(3,699)	(4,652)	(5,625)	(6,619)	(7,634)	(8,672)	(9,734)	(10,818)
Free Cash Flow	(55,678)	(56,781)	(57,900)	(2,108,731)	(2,767)	(3,699)	(4,652)	(5,625)	(6,619)	(7,634)	(8,672)	(9,734)	(10,818)
NPV	**(1,397,480)**												

Cash-Flow differences	1,605,681	(49,671)	(49,913)	(2,099,849)	7,028	7,028	7,028	7,028	7,028	7,028	51,618	51,618	51,618
Crossover Rate (IRR)	9.49%												