

# Pandemic turned into pandemonium: the effect on supply chains and the role of accounting information

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## Abstract

**Purpose** – The purpose of this study is to examine the disruptive effects of COVID-19 on supply chains and question the role of accounting information in managing these supply chains in the face of such disruptive effects.

**Design/methodology/approach** – The study first explains the effects of COVID-19 on the supply chains of business entities. It then explains the role of accounting information in supply chain management, questions accounting information's ability to play such a role, and makes recommendations for better accounting disclosures and accounting research for supply chains of firms. To illustrate the salient points, a case study of Fisher and Paykel Healthcare is conducted. It identifies the risks and uncertainties of supply chains exposed by COVID-19 disruptions to businesses.

**Findings** – COVID-19 has affected Fisher and Paykel Healthcare from both the supply-side (upstream) and demand-side (downstream) perspectives. On the supply side, it has disrupted the supply of raw materials used in the manufacture of respiratory devices and the costs of importing such materials. On the demand side, it has disrupted market logistics and customer demand. This has subsequently affected production. Such disruptions can be overcome through the dissemination of appropriate accounting information for the different stages of the supply chain to the managers. Such accounting information can also be useful to external stakeholders for minimizing their risks.

**Originality/value** – The study attempts to create an awareness of the supply chain uncertainties faced by managers and stakeholders arising from exogenous shocks, such as a pandemic, and how these uncertainties can be mitigated by aligning accounting information flows with the supply chain activity flows. The observations made in this paper are at a conceptual level and, therefore, can be applied to any industry.

**Keywords** COVID-19, Pandemic, Supply chain, Supply chain management, Management accounting, Accounting disclosures

**Paper type** Conceptual paper

## 1. Introduction

COVID-19 has created significant disruptions to supply chains at the national and international levels, creating new and exposing existing risks and uncertainties at the operational, tactical and strategic undertakings of firms. At the national level, governments have failed to maintain supply chains of the most basic necessities. Dai *et al.* (2020) note that before the crisis, the United States had a shortage of N95 masks and had refused assistance from local manufacturers offering to manufacture more. Much of this, they believe, arose due to the fragmented nature and the lack of transparency of supply chains. Barack Obama and Bill Gates had warned of a pandemic, but these were not taken seriously and neither were warnings of an overreliance on Chinese supply and demand markets (Shaban, 2020). Apple was over-reliant on Foxconn to produce Apple products, despite concerns from



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analysts and investors (Mickle and Kubota, 2020). Supply chains in many industries became too focused on cost efficiency and developing lean supply chains that are too slow to react to the changing environment. The COVID-19 disruptions exposed these weaknesses by showing that the supply chains were ill-equipped to deal with major shocks. Ivanov and Dolgui (2021) report that 94% of the Fortune 1,000 companies experienced supply chain (SC) disruptions, with lead-times twice as long and production halved as compared to that under normal operations.

In normal circumstances, businesses rely heavily on their supply chains. To respond to changes in the market, their supply chains need to adapt quickly through mass customization of their products. To reduce costs, enhance SC efficiency and respond to customer demands, supply chains have expanded globally; becoming more complex, more tenuous and more susceptible to disruptions from shocks (Sharifi and Ismail, 2006; Yang and Yang, 2010). However, COVID-19 has sped up the rate of deglobalization and neoliberalism; exposing new weaknesses and adding to the existing problems which include growing trade tensions (for example, Brexit, US-China trade war), recessions, climate disasters and the growing right wing movement (Free and Hecimovic, 2020). The purpose of this study is to investigate the effect of COVID-19 on SC risk and uncertainties and the accounting information that managers and external shareholders can use to manage those risks and uncertainties and make informed decisions. This is exemplified by a case study of the risks and uncertainties faced by Fisher and Paykel Healthcare (F&P Healthcare), New Zealand's largest manufacturer of medical devices and respiratory systems.

This study is important for three reasons. First, unlike the previous crises created by humans such as the Global Financial Crises (GFC) of 2008, COVID-19 has no clear boundaries in terms of what businesses it could affect and for how long and, when it struck, it had no known interventions that could curtail it. Second, F&P Healthcare is a rare instance where COVID-19 has created a surge in demand, unlike the reverse situation faced by many other companies and industries. Moreover, despite F&P Healthcare and its suppliers being an essential service, there have been upstream supply and downstream production disruptions. In addition, F&P Healthcare has a large international presence outside of New Zealand which magnifies the disruptions caused by the pandemic. Hence, a case study of F&P Healthcare is useful for explaining the SC effects of COVID-19.

This study contributes to the existing literature on risk and uncertainty at the supply chain level and in SC accounting. Previous research studied operational risk and sustainability risk within the SC and associated risk mitigation strategies including a range of management accounting techniques and the effect of management accounting on trust in the SC. While prior studies have examined the tools and techniques to deal with the risks and uncertainties associated with exogenous shocks in the context of the COVID-19 pandemic and outlined the role of accounting and scenario-planning (Ivanov and Dolgui, 2021; El Baz and Ruel, 2021; Free and Hecimovic, 2020; Tingey-Holyoak and Pisaniello, 2020), neither of the studies document these risks and uncertainties and the role of accounting information in managing them.

This study aims to create awareness of how accounting can play an informational role to notify managers and shareholders of the risks and uncertainties created by unprecedented external shocks and their potential impacts on the supply chain of firms. Managers and shareholders can also use accounting information in developing more agile, resilient and robust supply chains to cope with future disruptions. This study also identifies future research opportunities to examine management's use of accounting information during disruptions, and the extent of accounting disclosures needed about supply chains by both the managers and corporate stakeholders.

## 2. COVID-19: supply chain risks and uncertainties

Disruptions, man-made and natural, such as wars, political turmoil and the swine flu and Ebola outbreaks affect supply chains (Tang, 2006; Linghe and Masato, 2012). However, many disruptions can be predicted and for most cases, solutions can be planned. Unlike these more known forms of disruptions, COVID-19 type disruptions are unpredictable, their effects unknown and, likewise, no response is planned for them in advance.

COVID-19 has affected supply chains with differing degrees of severity. Guan *et al.* (2020) modeled the supply-chain effects of the pandemic for the countries in different forms of lockdown arrangements. Their findings indicate that the number of countries in lockdown at any one time and the duration of the lockdowns magnified supply chain effects. The pandemic also had indirect effects on countries not in lockdown through the global interconnectedness of supply chains and global trade relations. Wang *et al.* (2020) show the effects of the risks and uncertainties caused by COVID-19 on the New Zealand forestry industry due to its over-reliance on a single market, the Chinese market.

Previous research has characterized risks into operational SC risks and SC disruption risks or sustainability risks. The former can be further subdivided into supply risks, demand risks, manufacturing risks and so forth and affect the day-to-day operations of the SC (Christopher *et al.*, 2011; Sreedevi and Saranga, 2017). On the other hand, the latter can be subdivided into endogenous sustainability risks (e.g. carbon emissions, pollution, human rights violations, etc.) and exogenous sustainability risks (e.g. natural disasters, pandemics and financial crises) (Giannakis and Papadopoulos, 2016). While risk mitigation strategies have been researched in response to operational risks (e.g. bridging, buffering and postponement strategies) and endogenous sustainability risks such as environmental and social sustainability efforts, and supplier certification and development (Manhart *et al.*, 2020; Gouda and Saranga, 2018), the risks and uncertainties of unexpected exogenous sustainability disruptions also need to be examined and understood.

Prior research has used the resource-based theory and dynamic capabilities theory in developing risk mitigation strategies and has modeled a supply chain risk management (SCRM) model based on risk identification, risk assessment, risk treatment and risk control (Giannakis and Papadopoulos, 2016; El Baz and Ruel, 2021). These theories and methodologies are used in this study to help explain the use of accounting information as a management and shareholder resource to mitigate the uncertainties presented by COVID-19 and to plan for future disruptions.

## 3. The F & P healthcare case

F&P Healthcare is a New Zealand based company formed in 1934. It primarily started as a manufacturer of household appliances. In 2001, the company split into Fisher and Paykel Industries and Fisher & Paykel Healthcare. This study uses the latter to explain the risks and uncertainties exposed by COVID-19. F&P Healthcare has an unambiguous supply chain; raw material suppliers based in China, Asia and North America, manufacturing facilities in Auckland, New Zealand and Tijuana, Mexico and sales and exports to over 120 countries including Asia, Europe and North and South America (Fisher and Paykel, 2020; Evans, 2020). However, due to the company's specialization in the manufacturing of respiratory systems, the supply of raw materials from outside New Zealand and the labor-intensive manufacturing of these products, F&P Healthcare has encountered increasing uncertainty in its business as a result of COVID-19. This case study outlines the upstream and downstream risks and uncertainties of a supply chain in a pandemic setting.

### 3.1 Upstream supply chain

F&P Healthcare's upstream supply channels have been moderately affected by the pandemic. First, according to Evans (2020), some of the company's raw material suppliers have been

affected by COVID-19. At the outset of COVID-19, the [New Zealand Ministry of Foreign Affairs and Trade \(2020\)](#) noted that one of F&P's electrical component suppliers in the Philippines was subject to lockdown restrictions. However, this was later overturned by the New Zealand government to allow it to supply raw materials for the manufacture of medical equipment as an essential good. Prior to government intervention, lockdown restrictions disrupted overseas suppliers of F&P Healthcare. In addition, increasing competition and demand have encouraged raw material suppliers to work overtime, which suggests that developing relationships with key suppliers is of utmost importance for manufacturers when faced with uncertainties.

F&P Healthcare's 2020 annual report notes that due to the increasing and uncertain demand from end customers, the company has been forced to use more expensive modes of logistics transportation; air freight to ship raw materials quickly and efficiently from overseas. This increased the company's upstream shipping expenses. Unfortunately, due to the uncertain economic and logistical climate, there was high price volatility. The company decided to bear these costs, as opposed to passing them to consumers ([Fisher and Paykel Healthcare, 2020a](#)). [Fisher and Paykel Healthcare \(2020a, b\)](#) report bearing the extra air freight costs reflected a decrease in gross margin ([Table 1](#)). This means that exogenous shocks can create risks and uncertainties for the cost structure of goods and services.

### 3.2 Production

Since the beginning of the COVID-19 pandemic, there has been a surge in demand for F&P Healthcare's products. [Brettkelly \(2020\)](#) notes that the company is the world's largest manufacturer of two of the primary treatments for COVID-19 patients. Recently, the chief executive of F&P Healthcare revealed that as a result of the COVID-19 pandemic their Optiflow therapy has become a first-line treatment for treating patients with respiratory problems ([RNZ, 2020](#)). [Table 1](#) shows the effect of COVID-19 on sales revenue and sales growth in comparison to previous years (2017–2019).

This surge in sales, which reflects customer demand, has seen the company employ 700 and 800 more staff in their production facilities in New Zealand and Mexico, respectively, as

Income statement	2017	2018	2019	2020
Sales (Hospital products)	500.4	572.1	642.3	801.3
Sales growth (%)		9.7	9.1	18.1
Gross margin (%)	66.00	66.30	66.9	66.1
R&D expenditure	86.0	94.7	100.4	118.5
<i>Balance sheet</i>				
Trade receivables	116.5	128.3	136.4	195.9
Allowance for doubtful debts	1.1	0.5	0.4	3.0
Raw materials	35.6	32.6	38.8	50.3
Finished products	110.1	103.1	107.0	111.4
Income statement	Mar 2019–Sept 2019		Mar 2020–Sept 2020	
Sales (Hospital products)	353.6		681.0	
Gross margin (%)	67.1		61.7	
<i>Balance sheet</i>				
Inventories	146.5		233.6	

Source(s): [Fisher and Paykel Healthcare, 2020a, b](#)

**Table 1.**  
The effect of COVID-19  
on F&P Healthcare  
(NZ\$m unless  
otherwise stated)

well as the scheduling of extra shifts (BrettKelly, 2020). Production of acute respiratory medical devices has increased to cater to this increased demand. Furthermore, inventory counts show that while finished product stocks have remained stable, raw materials stocks have increased, as shown in Table 1. This is expected, as the uncertainty across production is reflected in the greater stocks of raw materials on-site. Evans (2020) also reports that during the height of the crisis (March 2020), production facilities were not running at full capacity; however, there have been plans to build a new Auckland factory and distribution center to cater to this demand.

Moreover, with the surge in demand and the employment of more workers to satisfy the demand, a major risk is the health and safety of workers. COVID-19 is easily transmittable between people in close contact, thus there is a greater risk of COVID transmission when there are more workers in a closely confined space. This has been the case in the production facility in Tijuana, Mexico where there have been COVID-19 outbreaks. This can contravene social distancing regulations. The COVID-19 virus also spread between people interacting throughout the SC, between different functions and SC partners. An infected person can contaminate the surfaces of medical devices, and while the virus may not last long on these surfaces, it is easily transmittable on products through production assembly and can infect other people working on different stages of product assembly. Hence, F&P Healthcare has to continually manage the risks of worker health, absenteeism and the resulting lower productivity. It is, therefore, critical for F&P Healthcare to balance the objectives of economies-of-scale and efficiency.

### 3.3 Downstream supply chain

The downstream channels of the F&P Healthcare supply chain include distribution, logistics and customer demand from hospitals that have a shortage of ventilators, masks and other personal protective equipment (PPE). The supply, manufacture and distribution of medical equipment is an essential service in many countries including New Zealand and Mexico, and thus may be allowed to bypass the 14-days quarantine period that is required for many other imported products. However, regulations may differ between countries which may pose added difficulties and complexities in the distribution network.

Second, due to the time-sensitive nature of overseas demands, F&P Healthcare may be forced to export a higher proportion of finished products by air freight. As this is a more expensive mode of transportation, F&P Healthcare will need to balance the time-sensitive demand with economies-of-scale to ensure air freight capacities are reached. Third, as mentioned previously, international demand for F&P Healthcare's products has increased. Due to this demand, sales have increased in all three regions that F&P Healthcare exports to. While a surge in demand in North America and the Pacific can be more easily catered for with production facilities in Mexico and New Zealand, respectively, demand in Europe and Asia will be more difficult to cater to without any production facilities but only distribution facilities in these regions. Thus, F&P Healthcare needs to undertake more extensive SC planning and ensure greater flexibility and agility in its distribution operations to be equally responsive in these regions.

### 3.4 Analysis

COVID-19 has severely affected F&P Healthcare's SC operations, resulting in major deviations in production and demand from the pre-pandemic era. Uncertainties due to the unpredictability of COVID-19 resulted in a surge in demand which F&P Healthcare had not forecasted. The time-sensitive nature of this demand has affected the upstream SC in what previous studies refer to as the bullwhip effect (Christopher *et al.*, 2011; Ivanov and Dolgui, 2021).

While there have been fewer disruptions to the upstream SC as compared to other areas of the supply chain, in part due to many governments allowing suppliers of essential products to continue supplying raw materials to medical equipment manufacturers, this has come at a cost. Due to downstream demand pressures, F&P Healthcare requires (1) greater volume of raw materials, which has put pressures on upstream suppliers (2) greater volume of raw materials on-site at any point in time which has tied up liquidity and (3) procured this supply at a greater cost. This may be fine in the short-term, but medium- and long-term planning is needed to cope with the effect of the pandemic. As [Paul and Chowdhury \(2021\)](#) reflect, COVID-19 has affected manufacturers most significantly; reductions in the supply of raw materials alongside high demand for finished products. However, their study focusses on production recovery.

COVID-19 increased demand rapidly which then increased production in a short span of time well beyond previous production outputs in F&P Healthcare. This combined with the unpredictable economic and logistical climate has required and will require F&P Healthcare to adopt more flexible and agile SC practices. Matching the increased demand with agile distribution, logistics, production and procurement operations will require a high level of understanding and visibility within and throughout the SC; the risks and uncertainties faced by their suppliers and customers, as well as the interconnection of these risks and uncertainties. Moreover, once the pandemic slows down and demand decreases back to normal levels, production capacities which were previously upscaled to cater to the increased demand will be sparsely used. F&P Healthcare may choose to use this equipment to manufacture other products or choose to rent the equipment out. This will further require flexibility and agility in maintaining production capacity and ensuring minimal wastage.

The production facilities in Mexico and New Zealand are currently working as global supply chains catering to customer demand from regional areas; North and South American demand from Tijuana, Mexico and Asia–Pacific demand from Auckland, New Zealand in addition to international demand from Europe. COVID-19 could either result in greater future demand in the European markets, even after the pandemic, in which case it would be feasible to develop three independent regional supply chains in the Americas, Europe and the Asia Pacific. On the other hand, European competitors who have the advantage of a greater physical presence may push F&P Healthcare out of Europe, in which case F&P Healthcare might scale down or close European operations. Thus, as supported by [Free and Hecimovic \(2020\)](#) and [Tingey-Holyoak and Pisaniello \(2020\)](#), regionalization and localization of supply chains and, thus, scenario planning will become more prevalent.

While the above suggestions deal with the internal management of SC disruptions caused by COVID-19, the involvement of external shareholders and debt holders in the financing of SC activities will promote greater flexibility and agility within the supply chain. Supply chains will hopefully be more strategically focused and accountable for the risk and uncertainty and value creation will improve to better inform the stakeholders, particularly the managers and investors. During periods of SC disruptions, financial liquidity and external capital financing would play an important role in the robustness and resiliency of the supply chain. External capital will have to be acquired to allow the focal company to provide financial relief and liquidity to its suppliers and customers. F&P Healthcare type firms will also require greater flexibility to absorb more costly operations such as the air freight costs for its goods.

An important point to consider is that apart from the early stages of COVID-19 lockdowns, supply chains for manufacturing and supplying medical equipment were considered essential services and could continue SC operations with minimal regulations. This cushioned the effects of the pandemic on F&P Healthcare and its supply chain. However, if another disruption of the same magnitude were to occur and had a greater effect on New Zealand businesses, a point to consider would be how would F&P Healthcare react to this

disruption? The next section outlines the use of accounting information and disclosures to inform managers, shareholders and debt holders of these uncertainties and to mitigate the effects of future disruptions.

#### 4. The role of accounting information

Previous studies have discussed the role of management accounting concepts and techniques to assist in supply chain management (SCM) (Ramos, 2004; Joyce, 2006; Free, 2008; Seal *et al.*, 2004) and sustainable and ethical SC disclosures (Birkey *et al.*, 2018; Deegan and Islam, 2010; Islam and Van Staden, 2018). Studies by Hendricks and Singhal (2003, 2005) examine the effect of SC glitches and disruptions on risk, stock-price performance and shareholder value. However, except for Free and Hecimovic (2020) and Tingey-Holyoak and Pisaniello (2020), there is sparse literature explaining the role of accounting information in informing (1) managers of the importance of these risks and uncertainties and (2) shareholders of the effect of COVID-19 on the investing firm and their investments. As illustrated in the case of F&P Healthcare, COVID-19 is multidimensional; unknown in length (period), breadth (extent) and depth (magnitude). Such is the uncertainty of the pandemic; accounting information can provide certainty to ensure adequate action is taken in the short-term, and appropriate preparation is taken for the medium-term and the long-term.

In the short-term, accounting information lays down the context in which COVID-19 affects different areas of SC activities and operations. As Free and Hecimovic (2020) recollect, supply chain managers have predominantly undertaken risk management in dealing with operational risks. El Baz and Ruel (2021) investigate the role of SCRIM in mitigating the effects of disruptions on SC resilience and robustness. Accounting information can help SCRIM identify the areas of strategic uncertainties and the magnitude of the financial impact of COVID-19 on operational aspects of the SC. In addition, the risks faced by the focal company are highly dependent on the risks and uncertainties faced by their suppliers and customers. Accounting for upstream (supplier) and downstream (customer) risks and uncertainties ensures visibility at the different stages of the SC. Accounting information can help identify the uncertainties at the different stages of the SC. Table 1 shows that a surge in demand has affected sales growth and uncertainties around demand forecasting and, thereby, increasing raw materials inventory. Accounting information also informs managers of the importance of these uncertainties and priority is given to them by the managers. Despite the difficulty in quantifying uncertainties, accounting information would help to estimate the impact more accurately than if no accounting information was available. Second, real-time, reliable and continuous dissemination of information in accounting integrated SCM systems can provide timely and dynamic accounting and finance information on SC operations and activities. This dynamism is required to effectively manage uncertainties as they surface.

The medium-term will give a clearer indication of how long disruptions will continue and how to plan for them for the long-term. In the context of F&P Healthcare, accounting numbers can provide information on economies-of-scale and whether the company is achieving peak efficiency; both labor efficiency and machine efficiency (asset utilization) to meet the increased demand. Accounting data will also enable managers to manage SC liquidity with cash tied in the inventory for raw materials. Accounting can also provide information on the financial impact of bearing extra expenses to expedite production and whether and when some of these extra costs need to be shifted on to the customers.

Performance measurement is a critical tool during SC disruptions and accounting information can help evaluate the performance of F&P Healthcare and its supply chain in response to key operational metrics, none more important than responsiveness, to meet the time-sensitive demand of Optiflow products. Hence the effect on operational metrics can help F&P Healthcare improve on weaknesses in the SC. This will help in re-evaluating short-term

(operational) and medium-term (tactical) plans and may result in developing more flexible and agile plans to improve responsiveness. Shareholders will also require information on the resilience and robustness of F&P's SC to meet the increased demand and as such will demand KPI's showing F&P's responsiveness and SC capabilities (resilience) (Free and Hecimovic, 2020). Accounting information can also help in the efficient coordination of F&P Healthcare's international procurement network, production of medical devices and the logistical requirement of different regions in the F&P Healthcare supply chain. From this, accounting information can be leveraged to evaluate different postponement strategies via a cost versus benefit analysis and activity-based costing, discussed as medium-term scenario-planning in Tingey-Holyoak and Pisaniello (2020).

Accounting can also assist in the development of strategic (long-term) scenario planning (Tingey-Holyoak and Pisaniello, 2020). While the primary objective of short-term and medium-term planning will be on mitigating the uncertainties of COVID-19 and contributing factors, long-term planning will be concerned about the planning and preparation for future SC disruptions. COVID-19 has highlighted the vulnerabilities and complexities of global supply chains and shifts toward regionalization or localization (Yang and Yang, 2010; Roh *et al.*, 2014; Free and Hecimovic, 2020). Thus, accounting information needs to be leveraged to make strategic decisions regarding the network design of the SC and its ability to create value.

In the case of F&P Healthcare, accounting information will help inform management of the overall SC performance and the performance of product categories in different regional markets. Accounting information used to measure SC responsiveness (tactical) can also help F&P make strategic decisions on whether to shift its' supplier in the Philippines closer to its' Auckland production facility or whether to form stronger strategic alliances/ vertical integration with suppliers who are important in achieving SC responsiveness. Second, accounting information can be used to assess whether the company can remain competitive in Europe in competition with competitors based in Europe and whether to operate independent regional supply chains in Mexico and Auckland. However, these decisions can only be operationalized provided accounting information is stored alongside tracking of F&P's extended supply chain (Free and Hecimovic, 2020). Accounting information can also help inform management of category management analyses and suggestions to maximize value creation in response to product offerings (Free, 2008). The bottom line is accounting information can help management to build more robust and resilient supply chains that can quickly recover from major disruptions and help maintain or improve SC value creation.

COVID-19 has heightened the need for accounting disclosures to inform shareholders of the effect of the risk and uncertainties on shareholder value. Hendricks and Singhal (2003, 2005) find a negative effect of SC disruptions on shareholder value. Hence shareholders can use accounting information and associated disclosures to manage these financial risks. While companies do disclose relevant supply chain information, these disclosures are limited and lack detail. Accounting disclosures can inform shareholders of the uncertainties that F&P Healthcare has encountered. It is also important to disclose the risks and uncertainties within their overseas suppliers and customers, international risks that are pronounced due to the pandemic and how these risks will affect the investing firm. This is despite the unknown and subjective nature of these disclosures and biased to how managers perceive these risks.

Accounting bodies have also set out types of disclosures that have become more material in external reporting during the COVID-19 pandemic and post-pandemic era (Moss Adams, 2020a, b; Fujita, 2020). While F&P Healthcare will likely be unaffected by going concern assessments, the business and supply chain environment of the manufacturing of a medical device may go through major changes. Smaller suppliers who are financially constrained may merge with larger suppliers who are better equipped to cope with future disruptions, and this may, in turn, affect F&P Healthcare's supply chain. Shareholders will want to be



informed of these changes to the business environment. Moreover, Research and Development (R&D) expenses at F&P Healthcare have grown disproportionately in the past year as compared to previous years (see [Table 1](#)). The pandemic may have partially motivated this increase in R&D, to find more effective respiratory technologies. This could potentially affect asset impairment valuations of existing technologies.

Accounting information has historically been used to measure and account for known risks; bad debts, warranties, future contingencies and operational and sustainable risks. COVID-19 has exposed many uncertainties that are unknown in relation to its financial impact. Nonetheless, this should be communicated to shareholders as it will help inform shareholders and debt holders of the estimated “approximate” effect of these disruptions on firm performance and shareholder value (shareholder relevant) and debt repayments and loan covenants (debt holder relevant).

The communication of accounting information to shareholders and debt holders is also key for the external financing of supply chains. Increased demand has not only affected F&P Healthcare but also their upstream suppliers who may be SME’s and financially constrained. Hence, providing liquidity to suppliers through F&P Healthcare’s own external financing may help sustain the SC. Furthermore, liquidity will help F&P Healthcare to better manage late payments from hospitals, who are short of supplies themselves and may struggle to finance purchases, or who finance purchases on credit. As [Table 1](#) shows, allowance for doubtful debts has increased as a proportion of trade receivables, indicating that it may take longer for F&P Healthcare to convert sales into cash flows. Thus, external financing will help F&P Healthcare to maintain financial flexibility and provide financial support to its suppliers and customers.

## 5. Conclusion and future directions

This study has reviewed the effects of COVID-19 on F&P Healthcare and its broader SC and the role that accounting information can play in managing the risks and uncertainties of the current pandemic and its associated disruptions, both current and future. The low frequency and high magnitude of such disruptions and the multidimensionality of the pandemic have affected procurement, logistics, production, distribution and demand among other areas of the SC. As such, COVID-19 has exposed the lack of supply chain visibility and adequate planning and preparedness, both in the short-term, medium-term and long-term scenarios. Accounting information can be used by managers and shareholders to increase visibility across the SC and be better prepared for future disruptions. The steps to use accounting information would include (1) management accountability and identification of risks and uncertainties and the associated impact, (2) the use of accounting-integrated supply chain systems in short-term and long-term planning, (3) the communication of the financial impact of SC disruptions on shareholder value and debt repayments and (4) the uses of accounting information as a mechanism for external financing of the supply chain.

While research has been conducted on the use of accounting information and the practice of accounting during operational SC disasters and endogenous disasters, there has not been much literature in the context of exogenous disasters like COVID-19. This is partly because there have been no such cases of the COVID-19 magnitude in the last one hundred years. Hence, further research can study the actual use of accounting information and the types of accounting disclosures used by managers during the COVID-19 pandemic. This can be done through field studies and interviews. Second, accounting disclosures have historically been based on known and quantifiable future events. However, COVID-19 disclosures, addressing future risks and uncertainties, were unknown and were not quantified for the most part. Therefore, future research can conduct empirical studies on the extent of COVID-19 disclosures, the details in these disclosures and the determining variables for such disclosures. In addition, COVID-19 has highlighted the dynamic environment in which

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supply chains operate and heightened the importance of continuous financial reporting. If financial reporting were to embrace supply chain accounting disclosures, financial reporting needs to be continuous to keep up with the dynamic supply chain environment and the dynamism of product, information and financial flows as well as the associated risks and uncertainties throughout the supply chain.

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