

# **ALGORITHMIC PRICING AND ITS IMPLICATIONS ON COMPETITION LAW AND POLICY IN SOUTH AFRICA**

*by*

Student no: 1612320

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## DECLARATION

I, **student no: 1612320**, declare that this Research Report is my own unaided work. It is submitted in partial fulfillment of the requirements for the degree of Master of Laws (by Coursework and Research Report) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

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## ABSTRACT

The upsurge in the use of technology has proliferated the use of pricing algorithms which have become essential to e-commerce. Although South Africa had been privy to this shift prior to 2020, the onslaught of the Covid-19 pandemic exacerbated this shift. While the use of pricing algorithms in Competition law is accompanied by many pro-competitive benefits, it is also accompanied by various anti-competitive effects which include algorithmic-based collusion. Despite the fact that this topic has been addressed within the context of competition law in other jurisdictions, it has yet to be addressed from the viewpoint of the South African Competition Act 58 of 1998. Accordingly, the aim of this paper is to establish whether the Competition Act and South African competition policy at large, is robust enough to withstand the effects of digitalisation, particularly from the perspective of section 4 of the Competition Act which regulates relationships between competitors. In carrying out this analysis, this paper defines pricing algorithms and outlines their pro-competitive and anti-competitive effects. Thereafter, through the prism of four scenarios where pricing algorithms facilitate collusion, as posited by Ezrachi and Stucke in their seminal work on Virtual Competition, this paper establishes the robustness of the Competition Act by applying the scenarios to the Acts. Ultimately, this paper concludes that the current Competition Act (as amended) is in fact robust enough to tackle situations where algorithmic-based collusion arises. Where it is not, this paper argues that it is, at present, unnecessary for the relevant authorities to amend the current law or introduce any new laws.

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## I INTRODUCTION

According to Dan Schulman, ‘We went from being the Flintstones to the Jetsons in nine months.’<sup>1</sup> This often-cited quip from the CEO and President of PayPal perfectly encapsulates the digital world that we have come to inhabit and the rapid rate at which we have done so. A seemingly natural consequence of the shift to digitalisation has been the rapid rise of digital markets and the digital economy at large.<sup>2</sup> Within a South African context, firms and consumers prior to 2020 (albeit to a limited extent) had been privy to this digital shift. However, the onset of the Covid-19 pandemic accelerated this shift whereby pre-existing online market players (such as Takealot and Superbalist) gained traction, many brick-and-mortar stores or businesses established their own online presence and consumers increasingly began to purchase goods and services online.<sup>3</sup> In fact, a survey conducted by Visa in 2020, showed that nearly 65% of South Africans purchased their groceries online for the first time and just over 50% made their first online purchases from dispensaries due to the pandemic.<sup>4</sup>

It is common discourse that as a result of this shift, significant benefits have accrued to businesses and consumers alike.<sup>5</sup> Nevertheless, the rise of e-commerce has raised genuine and legitimate concerns amongst legal scholars and competition authorities all over the world. The shared sentiment of these various scholars and authorities, although to varying degrees, is that despite the benefits of online commerce, it poses serious threats to current competition law regimes and their ability to effectively regulate competition in the digital era.<sup>6</sup> Examples of these threats are found in the seemingly unstoppable abuse of dominance by tech-giants such

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<sup>1</sup> Innovexa Solutions ‘10 Digital Transformation Quotes that will Change the Way You View it’ (21 October 2019) available at <https://medium.com/@InnovexaSolutions/10-digital-transformation-quotes-that-will-change-the-way-you-view-it-c57fcc5fcd80>, accessed on 30 May 2022.

<sup>2</sup> Competition Commission *Competition in the Digital Economy: For Public Comments* (7 September 2020) para 1.2.

<sup>3</sup> Competition Commission *Online Intermediation Platforms Market Inquiry: Statement of Issues* (19 May 2021) para 24.

<sup>4</sup> Thembaletu Buthelezi & James Hodge ‘Chapter IV: Competition policy in the digital economy: The South African perspective’ *United Nations Conference on Trade and Development* (2021) at 69, available at <https://www.compcom.co.za/wp-content/uploads/2021/07/CCSA-Contribution.pdf>, accessed on 11 November 2022.

<sup>5</sup> Antonio Capobianco & Anita Nyeso ‘Challenges for Competition Law Enforcement and Policy in the Digital Era’ (2018) 9 *Journal of European Competition Law and Practice* 1 at 19.

<sup>6</sup> Competition Commission op cit note 2 para 3.

as Amazon and Google, the complexity of mergers within the realm of the digital world as well as the possibility of undetected cartel behaviour between digital firms.

As mentioned, the rise in the use of technology has proliferated the use of pricing algorithms. Simply defined, pricing algorithms refer to computerized formulas that automatically determine prices based on a set of data inputs.<sup>7</sup> These algorithms are not only essential to the success of e-commerce firms but arguably lie at the heart of e-commerce due to the fact that the accuracy, efficiency and speed with which algorithms take pricing decisions, cannot be replicated by humans.<sup>8</sup> Whilst there are obvious competitive advantages that accompany the utilisation of pricing algorithms, it has been widely accepted that the use of these algorithms has the ability to facilitate anticompetitive behaviour such as collusion.<sup>9</sup> The debate on algorithmic-based collusion was initiated by legal scholars including Ezrachi, Stucke, Gal and Mehra, with competition authorities only foraying into said debate in recent years.<sup>10</sup> On a global front, the Organisation for Economic Cooperation and Development's (OECD) round table on the relationship between algorithms and collusion concluded that the widespread use of pricing algorithms by firms poses a clear threat to competition authorities, especially from the viewpoint that the algorithms have significant collusive potential.<sup>11</sup>

Similarly, the World Economic Forum, in its white paper titled 'Competition Policy in a Globalised Digitalised Economy,' recognised the very real potential of algorithmic-based collusion.<sup>12</sup> Moreover, there is a plethora of academic literature pertaining to algorithmic-based collusion in the Global North. Although the South African Competition Commission has released two discussion papers pertaining to the digital economy, to date, there is no academic literature that pertains to the effect of pricing algorithms on competition law within a South African Context.

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<sup>7</sup> AJ MacKay & SM Weinstein 'Dynamic Pricing Algorithms, Consumer Harm, and Regulatory Response' (2022) *Working Paper 22-050* for the Harvard Business School.

<sup>8</sup> Anik Bhaduri 'Tacking Collusion in the Digital Marketplace: Is the Competition Act Enough?' (2020) 41 *European Competition Law Review* 2 at 103.

<sup>9</sup> *Ibid* at 101.

<sup>10</sup> Cento Veljanovski 'What do we now know about Machine Collusion' (2022) 13 *Journal of European Competition Law and Practice* 1 at 47.

<sup>11</sup> Hans-Theo Normann & Martin Sternberg 'Do Machines Collude Better than Humans?' (2021) 12 *Journal of European Competition Law and Practice* 10 at 765.

<sup>12</sup> World Economic Forum *White Paper: Competition Policy in a Globalised Digitalised Economy* (2019) at 9.

Accordingly, this paper seeks to establish whether the Competition Act 89 of 1998 ('The Act') and current South African competition policy is robust enough to withstand the effects of digitalisation. In particular, it seeks to ascertain whether or not section 4 of the Act, the provision which regulates restrictive horizontal practices, is robust enough to tackle algorithmic-based collusion. This analysis will be carried out through the prism of the four scenarios where pricing algorithms facilitate collusion, as posited by Ezrachi and Stucke in their seminal book on virtual competition titled, 'Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy.'<sup>13</sup>

## II PRICING ALGORITHMS IN COMPETITION LAW

In order to determine whether pricing algorithms facilitate collusion, it must first be established what algorithms are, how they work and the competitive advantages and disadvantages that they generate. To this end, Verdugo defines an algorithm as, 'a set of step-by-step instructions, to be carried out quite mechanically, so as to achieve some desired result.'<sup>14</sup> Alternatively, algorithms may be regarded as, 'sets of mathematical steps designed to solve specific problems or perform specific tasks.'<sup>15</sup> From the outset, it must be noted that the use of algorithms is not a new phenomenon.<sup>16</sup> In fact, algorithms have been utilised by traditional firms for a number of years.<sup>17</sup> For example, British Airways has employed pricing algorithms since the 1970s.<sup>18</sup> With that being said, the shift and subsequent rise of e-commerce combined with the availability of large volumes of consumer data, has increased the power and reach of algorithms, especially within the context of digital markets.<sup>19</sup> It is therefore reasonable to accept that algorithms are fundamental elements of the digital world.<sup>20</sup> Whilst the functionality

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<sup>13</sup> Ariel Ezrachi & Maurice E. Stucke *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (2016).

<sup>14</sup> Catalina González Verdugo 'Horizontal Restraint Regulations in the EU and the US in the Era of Algorithmic Tacit Collusion' (2018) 7(1) *UCL Journal of Law and Jurisprudence* 114 at 117.

<sup>15</sup> Barbora Jedličková 'Digital Polyopoly' (2019) 42 *World Competition Law and Economics Review* 309 at 315.

<sup>16</sup> Peter Georg Picht & Benedikt Freund 'Competition (law) in the era of algorithms' (2022) *Research Paper No. 18-10* for the Max Planck Institute for Innovation and Competition at 3.

<sup>17</sup> Ana Pošćić & Adrijana Martinović 'EU Competition Law in the Digital Era: Algorithmic Collusion as a Regulatory Challenge' (2020) 4 *EU and Comparative Law Issues and Challenges Series* 1016 at 1018.

<sup>18</sup> *Ibid.*

<sup>19</sup> MacKay op cit note 7 at 12.

<sup>20</sup> Jedličková op cit note 15 at 333.

of algorithms is varied and they may subsequently be used for a myriad of tasks,<sup>21</sup> the focus of this research paper is on pricing algorithms in competition law.

*(a) Pricing algorithms defined*

In essence, pricing algorithms are computational formulas designed and employed by firms to automatically set prices that will maximize profits.<sup>22</sup> While the design of each algorithm may be unique, the basic formula of a pricing algorithm remains the same: the algorithm applies a computerized rule to set prices based on various inputs.<sup>23</sup> More specifically, the pricing algorithm accepts information which acts as the input to produce the output which is the price.<sup>24</sup> This information may either be classified as internal or external input. Internal input is that information which pertains to the firm such as its costs and its agreed profit margin whereas external input refers to the information that the algorithm collects from the market, such as the demand and supply for specific goods or services, the demographics and preferences of the firm's customers as well as the prices of competitors.<sup>25</sup> With that being said, the sophistication and complexity of each pricing algorithm varies.<sup>26</sup> On the one hand, a simple algorithm is programmed to perform a specific task and does so acting within the bounds of its pre-set parameters.<sup>27</sup> On the other hand, a more complex algorithm is able to modify itself by using the input that it receives to make either a decision or prediction, instead of following strict and unchanging program instructions.<sup>28</sup> In other words, complex algorithms, through machine-learning (a form of artificial intelligence) are able to learn through its own experiences by trial and error.<sup>29</sup> The process of learning by trial and error is referred to as deep learning and as a

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<sup>21</sup> Michal S. Gal 'Algorithms as Illegal Agreements' (2019) 34 *Berkeley Technology Law Journal* 67 at 79.

<sup>22</sup> Organisation for Economic Coordination and Development *Algorithms and Collusion: Competition Policy in the Digital Age* (2017) at 16.

<sup>23</sup> MacKay op cit note 7 at 12.

<sup>24</sup> Bhaduri op cit note 8 at 103.

<sup>25</sup> MacKay op cit note 7 at 12.

<sup>26</sup> Ulrich Schwalbe 'Algorithms, Machine Learning and Collusion' (2019) 14 *Journal of Competition Law and Economics* 4 at 575.

<sup>27</sup> Jedličková op cit note 15 at 315.

<sup>28</sup> Schwalbe op cit note 26 at 576.

<sup>29</sup> Jedličková op cit note 15 at 315.



result, complex algorithms are often referred to as deep-learning algorithms.<sup>30</sup> Due to the fact that these deep-learning algorithms are programmed to mimic the structure of the brain's neurons which are responsible for making decisions, they retain a level of autonomy from their predetermined parameters in that they are capable of developing their own strategies by observing existing patterns.<sup>31</sup> Accordingly, deep-learning allows an algorithm to process and utilize the information that it receives (in the form of data) that might not have been predicted by its human designer, thereby achieving levels of accuracy and efficiency which is impossible for humans to accomplish.<sup>32</sup>

The resultant effect of the efficient and accurate nature of self-learning algorithms is that they are becoming an increasingly dominant feature of the commercial world.<sup>33</sup> In fact, these algorithms are already being used to set prices in an array of industries, including the transport industry with the advent of ride-sharing apps such as Uber, the retail industry with retailers including Amazon, Superbalist and Takealot as well as the air travel industry.<sup>34</sup> From a practical perspective, it is clear that the increasing utilisation of these algorithms has changed the structure and competitive landscape of traditional markets.<sup>35</sup>

*(b) The effect of pricing algorithms on competition*

While pricing algorithms are not intrinsically good or bad, their effects on competition are not necessarily neutral.<sup>36</sup> Their nature is dependent on how firms elect to use them, the structure of the relevant markets and whether or not the incentives of the firms align with the interests of society.<sup>37</sup> Whilst promising to yield a multiplicity of procompetitive benefits for both firms and consumers, pricing algorithms simultaneously have the ability facilitate, foster and sustain

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<sup>30</sup> Ibid.

<sup>31</sup> Jedličková op cit note 15 at 316.

<sup>32</sup> Bhaduri op cit note 8 at 102.

<sup>33</sup> Guan Zheng & Hong Wu 'Collusive Algorithms as Mere Tools, Super Tools or Legal Persons' (2019) 15 *Journal of Competition Law and Economics* 123 at 123.

<sup>34</sup> MacKay op cit note 7 at 1.

<sup>35</sup> Ariel Ezrachi & Maurice E. Stucke 'Artificial Intelligence & Collusion: When Computers Inhibit Competition' (2017) *University of Illinois Law Review* 1775 at 1778 & 1781.

<sup>36</sup> Maurice E. Stucke & Ariel Ezrachi 'Looking up in the Data-Driven Economy' (2017) 2 *Antitrust Chronicle* 16 at 17.

<sup>37</sup> Ibid.

anticompetitive behaviour such as collusion.<sup>38</sup> With that being said, one of the pro-competitive effects of pricing algorithms include their ability to monitor and adapt to competition. In particular, the speed and accuracy at which pricing algorithms collect and analyse great volumes of data - which is used to respond to the prices of competitors and changing market conditions - is unparalleled in efficiency.<sup>39</sup> In the past, it was humans who monitored market activity and made determinations as to whether or not to raise or lower prices, and if so, by how much.<sup>40</sup> Naturally, the determination and implementation of pricing decisions took weeks, if not months.<sup>41</sup> At present, pricing algorithms are able to make pricing decisions within milliseconds.<sup>42</sup> Simply put, the ability of pricing algorithms to rapidly take into account numerous factors and variables when making pricing decisions, provides to firms a heightened level of analytical sophistication that the human mind cannot achieve without considerable time and effort.<sup>43</sup>

Pricing algorithms further provide to firms a competitive advantage by segmenting the relevant market via dynamic pricing.<sup>44</sup> Dynamic pricing may be defined as the strategic pricing response to the fluctuation of markets in real time in a bid to achieve specific objectives such as the maximization of profit, the maximization of sales volume and minimization of sale time.<sup>45</sup> In essence, dynamic pricing entails the changing of the prices of goods and services in reaction to the fluctuating conditions of the market and/or to increased access to information pertaining to demand and supply in the relevant market.<sup>46</sup> Dynamic pricing is, in theory at least, a near perfect application of the demand/supply model since it optimises the price of a good or service based on available stock and anticipated demand.<sup>47</sup> Here, the competitive advantage lies in the fact that firms are able to reduce their costs by optimising inventory levels based on anticipated demand and consumers benefit from the lowest possible price.<sup>48</sup> In light of the fact

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<sup>38</sup> Ezrachi & Stucke op cit note 35 at 1808.

<sup>39</sup> Ezrachi & Stucke op cit note 13 at 12.

<sup>40</sup> Ezrachi & Stucke op cit note 35 at 1780.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Gal op cit note 21 at 79.

<sup>44</sup> Ezrachi & Stucke op cit note 35 at 1780.

<sup>45</sup> Verdugo op cit note 14 at 119.

<sup>46</sup> Cassey Lee 'The Landscape of Pricing and Algorithmic Pricing' (2020) *Working Paper 2020-06* for the Yusof Ishak Institute at 12.

<sup>47</sup> Ezrachi & Stucke op cit note 35 at 1780.

<sup>48</sup> Ezrachi & Stucke op cit note 13 at 7.

that pricing algorithms allow firms to immediately respond to changes in any supply conditions including, *inter alia*, the availability of stock, capacity constraints and the prices of competitors, they are procompetitive to the extent that they improve market efficiency.<sup>49</sup>

Furthermore, pricing algorithms are ostensibly pro-competitive in that they increase competition in instances where they provide firms with the opportunity to personalise prices of their consumers.<sup>50</sup> In other words, they facilitate perfect price discrimination by assisting firms to price their products and services based on the consumer's location, browsing history and private history alongside a variety of other private information.<sup>51</sup> The attendant effect is the improvement of efficiency to the extent that firms can supply their goods or services at lower prices to consumers who have a low willingness to pay and higher prices to consumers who have a high willingness to pay.<sup>52</sup> Over and above the efficiency advantages, an additional procompetitive advantage provided by pricing algorithms is the fact that they increase the quality and availability of pricing information thereby increasing market transparency.<sup>53</sup> Accordingly, consumers are able to efficiently compare the prices of competitors' goods and services.<sup>54</sup> An increase in market transparency is procompetitive due to the fact that the allocation of resources is more efficient and the best good or service is sold to the consumer at the lowest possible price.<sup>55</sup>

In spite of the aforementioned pro-competitive effects, pricing algorithms have the potential to significantly impact the current competitive landscape for the worse.<sup>56</sup> As accurately stated by McSweeney, 'The great promise of algorithms and AI is their ability to transcend human limitations and produce better outcomes by processing more data, faster. The issue is that "better outcomes" from the perspective of firms won't always align with better outcomes from the perspectives of consumers.'<sup>57</sup> It is common discourse that the two major

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<sup>49</sup> OECD op cit note 22 at 16.

<sup>50</sup> Schwalbe op cit note 26 at 571.

<sup>51</sup> OECD op cit note 22 at 16.

<sup>52</sup> Ibid.

<sup>53</sup> Schwalbe op cit note 26 at 572.

<sup>54</sup> Patrick L. Krauskopf et al. 'The Digital Economy, Big Data and Competition' in United Nations Conference on Trade and Development Research Partnership Platform *Competition and Consumer Protection Policies for Inclusive Development in the Digital Era* (2021) 8-22 at 12.

<sup>55</sup> Ezrachi & Stucke op cite not 35 at 1781.

<sup>56</sup> Ezrachi & Stucke op cit note 13 at 28.

<sup>57</sup> Terrell McSweeney 'Algorithms and Coordinated Effects' *Oxford: Online Markets and Offline Effects Conference* (22 May 2017) at 58 available at

problems associated with the utilisation of pricing algorithms are price discrimination and algorithmic-based collusion.<sup>58</sup> With that being said, a full discussion of price discrimination falls outside the scope of this paper since price discrimination, as seen above, has both anti-competitive and pro-competitive effects. Accordingly, the focus herein lies in the issue of algorithmic-based collusion. This issue is elucidated by Ezrachi and Stucke, who submit that as pricing shifts from humans to computers, so too will the types of collusion.<sup>59</sup> To this end, the authors posit four scenarios whereby pricing algorithms, in their opinion, facilitate collusion to varying degrees.

### III HOW PRICING ALGORITHMS FACILITATE COLLUSION

As mentioned above, in their seminal work on competition in the virtual world, Ezrachi and Stucke argue that there are four scenarios in which pricing algorithms facilitate collusion. These scenarios – the messenger scenario; the hub and spoke scenario; the predictable agent scenario and the digital eye scenario – will be discussed below.

#### *(a) The Messenger Scenario*

In this scenario, pricing algorithms are merely tools utilised by firms in the creation, execution and/or maintenance of a cartel.<sup>60</sup> Pošćić succinctly encapsulates this notion, stating that, an algorithm is simply a tool that gives effect to the intention of its developer – this intention may be to either implement a pre-existing agreement or to detect and penalize rogue behaviour.<sup>61</sup> In essence, the pricing algorithms serve as the messenger between the cartel members regarding any planned price increases, price decreases, discounts and reductions in supply.<sup>62</sup> Practically, this scenario arises in situations where executives agree to collude by fixing prices and thereafter, leave it to the pricing algorithm – who acts as the messenger – to monitor and

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[https://www.law.ox.ac.uk/sites/default/files/migrated/online\\_markets\\_and\\_offline\\_welfare\\_effects.pdf](https://www.law.ox.ac.uk/sites/default/files/migrated/online_markets_and_offline_welfare_effects.pdf), accessed on 6 April 2022.

<sup>58</sup> Ibid.

<sup>59</sup> Ezrachi & Stucke op cit note 13 at 29.

<sup>60</sup> Ibid at 39.

<sup>61</sup> Pošćić op cit note 17 at 1024.

<sup>62</sup> Lee Bernhardt & Ralf Dewenter ‘Collusion by code or algorithmic collusion? When pricing algorithms take over’ (2020) 16 *European Competition Journal* 312 at 326.

enforce their illicit agreement.<sup>63</sup> Such a scenario is illustrated in the 2015 case of *United States v David Topkins*,<sup>64</sup> whereby the defendant and his co-conspirators were found to have entered into a price-fixing cartel pertaining to posters sold via the Amazon Marketplace. In effecting the cartel, the conspirators agreed to use a pricing algorithm to manipulate, increase and stabilize the prices of the posters.<sup>65</sup> Here, it must be noted that while the conspirators used pricing algorithms in the formation and maintenance of their cartel, they still had a proverbial foot in the traditional cartel world due to the fact that they discussed and subsequently agreed to fix prices for their products prior the utilisation of the pricing algorithm.<sup>66</sup> It follows that despite the fact that pricing algorithms facilitate the illegal behaviour, the illegality lies in the agreement or coordinated conduct carried out between humans.<sup>67</sup> Accordingly, it can be said that pricing algorithms facilitate collusion to the extent that they are merely a technological extension of human will in that they perform tasks that would otherwise be performed by humans in collusive situations.<sup>68</sup>

*(b) The Hub and Spoke Scenario*

This scenario encapsulates instances where a single algorithm is used by multiple competitors to determine the market price or react to market changes.<sup>69</sup> Simply put, pursuant to the conclusion of vertical agreements with a third party (the hub), the parallel utilisation of the same algorithm by several competitors (the spokes), may facilitate collusion.<sup>70</sup> While a single vertical agreement by itself, does not necessarily indicate an attempt to manipulate market prices or generate anticompetitive effects, the concern arises in situations where a cluster of the same or similar vertical agreements are concluded between a third party (the hub) and numerous competitors (the spokes), which may lead to the formation of a classic hub and spoke cartel, whereby the hub assists with the coordination of the collusion, thus resulting in inflated

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<sup>63</sup> Ezrachi & Stucke op cit note 35 at 1784.

<sup>64</sup> *United States v David Topkins* [30 April 2015].

<sup>65</sup> Ezrachi & Stucke op cit note 35 at 1786.

<sup>66</sup> *Ibid* at 1809.

<sup>67</sup> Ezrachi & Stucke op cit note 13 at 39

<sup>68</sup> *Ibid* at 41.

<sup>69</sup> Ezrachi & Stucke op cit note 35 at 1787.

<sup>70</sup> *Ibid* at 1796.

prices.<sup>71</sup> To this end, Schwalbe correctly asserts that in these cases, the algorithm is merely a facilitating device where the third party, acting as the hub, serves an information exchange function in the creation and maintenance of a cartel.<sup>72</sup> Here, it is important to recognise that such a cartel will only materialize when a central hub controls the various spokes, with each spoke engaging in separate transactions, with the hub thus collectively establishing a single cartel.<sup>73</sup> It follows, that in this scenario, the competitors do not directly communicate with one another.<sup>74</sup> With that being said, a hub and spoke conspiracy is akin to cartel behaviour due to the fact that the competitors, through the use of a central mastermind (the hub), are mutually dependent and aware of one another's behaviour.<sup>75</sup>

Ezrachi and Stucke assert that there are two instances in which a hub and spoke conspiracy may arise within the context of e-commerce.<sup>76</sup> In the first instance, competitors outsource their pricing to the same third-party vendor (a developer of algorithms).<sup>77</sup> Here, each competitor acting with the knowledge that its rivals are doing the same, provides the developer with data and pricing authority.<sup>78</sup> The developer's pricing algorithm then utilizes the information that it receives from each competitor to determine the optimal prices for the relevant products or services.<sup>79</sup> Consequently, the prices of the goods or services stabilize whilst the profits of the algorithmic developer increase.<sup>80</sup> It is essential to acknowledge that pricing is increasingly being outsourced to third party vendors due to the fact that pricing is becoming more dynamic and data driven for reasons explained above.<sup>81</sup> At the same time, it must be recognised that despite the independent business justifications that each competitor might have for outsourcing its pricing to an algorithmic developer, it is not unlikely that the competitors will be aware of the fact that in doing so, prices and their profits may increase thus giving rise to a classic hub and spoke cartel.<sup>82</sup>

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<sup>71</sup> Ibid at 1782.

<sup>72</sup> Schwalbe op cit note 26 at 572.

<sup>73</sup> Ezrachi & Stucke op cit note 13 at 46.

<sup>74</sup> Ibid.

<sup>75</sup> Pošćić op cit note 17 at 1025.

<sup>76</sup> Ezrachi & Stucke op cit note 13 at 46-49.

<sup>77</sup> Ibid at 48-49.

<sup>78</sup> Ibid.

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid at 47.

<sup>82</sup> Ibid at 49.

The second instance involves platforms which bring together buyers and sellers where the platform's algorithm sets the price and multiple competitors use the platform's price.<sup>83</sup> This may be problematic due to the fact that higher prices are the likely outcome when many competitors rely on the same algorithm.<sup>84</sup> Ezrachi and Stucke use the example of the pricing algorithm utilised by Uber to compute the pricing for its services in a bid to illustrate the possible anticompetitive effect of platforms providing a common algorithm to competitors.<sup>85</sup> The authors argue that as more drivers make use of Uber's pricing algorithm, the supply and demand model will likely result in situations where the algorithm artificially raises the prices charged to consumers for Uber's services – To illustrate their point, the authors cite reported instances where this has been the case.<sup>86</sup>

In essence, this scenario illustrates that pricing algorithms may facilitate collusion where competitors use the same algorithm developed by a third party to set a common and profit-maximising price for a particular good or service, thereby creating a hub and spoke cartel.<sup>87</sup>

*(c) The Predictable Agent Scenario*

Under this scenario, also referred to as 'tacit collusion on steroids,' firms unilaterally design and implement a complex pricing algorithm in a bid to maximize their profits and at no point intentionally agree to fix prices.<sup>88</sup> Instead, firms use their independently designed algorithms to constantly monitor and react to any price changes in the market or follow the price leadership of other firms.<sup>89</sup> As stated by Bernhardt, this scenario 'encompasses the parallel use of individual algorithms, resulting in tacitly coordinated prices.'<sup>90</sup> It follows that the one condition that must be present for this scenario to occur is a comparable design of each of the firms' pricing algorithms since the algorithms must be compatible with one another so that they can signal their respective intentions and communicate to their competitors what can be

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<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Ezrachi & Stucke op cit note 35 at 1788.

<sup>86</sup> Ibid.

<sup>87</sup> Picht op cit note 16 at 404.

<sup>88</sup> Ezrachi & Stucke op cit note 13 at 60.

<sup>89</sup> Bernhardt op cit note 62 at 329.

<sup>90</sup> Ibid at 328.

expected from the firm in respect of their pricing decisions.<sup>91</sup> It can therefore be said that by employing similar algorithms, firms can achieve collusion, whether it be intentional or unintentional.<sup>92</sup>

According to Ezrachi and Stucke, the widespread use of similarly designed algorithms by competitors may facilitate collusion since the employment of these complex pricing algorithms has the potential to make it easier for firms to achieve and sustain collusion without any agreement, concerted practice or even any human interaction.<sup>93</sup> It follows, that unlike the first two scenarios which facilitate explicit collusion, this scenario facilitates tacit collusion in that the firms independently create and implement the algorithms and therefore do not intend to create a price-fixing cartel but each firm, by unilaterally shifting their pricing decisions to pricing algorithms, brings the conditions of the market closer to that which is necessary for conscious parallelism thus leading to inflated prices.<sup>94</sup> The authors premise their argument on the grounds that a shift in pricing decisions from humans to algorithms will result in an increase in price transparency in certain market conditions such as oligopolies.<sup>95</sup> As a consequence, both the firm's competitors as well as its customers can easily and promptly ascertain all of the competitively significant terms.<sup>96</sup> In other words, the utilisation of advanced pricing algorithms transforms the market conditions to the extent that the algorithms increase transparency which in turn renders the relevant market more to susceptible tacit collusion (or conscious parallelism).<sup>97</sup> Moreover, not only will tacit collusion under this scenario become more common but it will also become more sustainable.<sup>98</sup>

It follows that in market conditions amenable to conscious parallel conduct, pricing algorithms can coordinate in one of two ways.<sup>99</sup> The first instance is where similarly yet independently designed algorithms engage in parallel accommodating conduct that comes about not through communication between firms, but through the algorithms' ability to monitor market activity and rationally follow price leadership thus stabilizing interdependence in the

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<sup>91</sup> Ibid at 329.

<sup>92</sup> Ibid at 330.

<sup>93</sup> Capobianco op cit note 5 at 25.

<sup>94</sup> Ezrachi & Stucke op cit note 35 at 1780 & 1790.

<sup>95</sup> Ibid at 1780.

<sup>96</sup> Ibid.

<sup>97</sup> Ibid at 1783.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid at 1789.



market and leading to increased prices.<sup>100</sup> The second instance arises in situations where the algorithms themselves reach a similar common understanding to swiftly detect and punish competitors' price cutting which comes about through deep-learning thus ensuring that pricing algorithms will not deviate from the supra-competitive price.<sup>101</sup> It is important to recognise that price increases in these instances are a natural consequence of tacit collusion, which is not itself illegal due to the fact that it concerns rational reactions to the relevant market.<sup>102</sup> With that being said, the authors question whether or not this somewhat artificial creation of conscious parallel conduct should give rise to antitrust intervention, especially in light of the fact that algorithms stabilize tacit collusion since they do not exhibit human characteristics in that do not respond in emotion and therefore do not fear detection and imprisonment.<sup>103</sup>

*(d) The Digital Eye Scenario*

In the most complex scenario, which the authors refer to as the next frontier,<sup>104</sup> competing firms unilaterally design and implement highly sophisticated pricing algorithms that independently determine the means to optimize profit by way of self-learning and experimentation based on the perpetual data that it receives from the relevant market – without any human intervention.<sup>105</sup> Simply put, self-learning algorithms, through the use of Artificial Intelligence (AI), independently determine the prices that their firms will set and have the ability to automatically collect data and adapt their pricing strategy based on the data that it collects without any human intervention save for the original design of the algorithm.<sup>106</sup> While this scenario may be likened to Scenario 3 in that it facilitates tacit collusion, Ezrachi and Stucke, contend that not only would self-learning algorithms in this context make tacit collusion likelier, but they have the potential to exacerbate tacit collusion, even in markets that are not generally susceptible to conscious parallel conduct due to the fact that the algorithms in this scenario have the ability to engage in entirely autonomous decision making.<sup>107</sup>

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<sup>100</sup> Ibid at 1790-1791.

<sup>101</sup> Ibid at 1789.

<sup>102</sup> Ibid at 1783.

<sup>103</sup> Ibid at 1780 & 1793.

<sup>104</sup> Ezrachi & Stucke op cit note 13 at 71.

<sup>105</sup> Ezrachi & Stucke op cit note 35 at 1783.

<sup>106</sup> Pošćić op cit note 17 at 1029.

<sup>107</sup> Ezrachi & Stucke op cit note 13 at 71 & 76.

Accordingly, the pricing algorithms in this scenario do not merely facilitate collusion since they are agents of collusion themselves and are thus able to tacitly collude without any human intervention.<sup>108</sup> It follows that in this scenario, which is been regarded as legal science fiction by scholars including Petit,<sup>109</sup> the concepts of ‘agreement’ and ‘intent’ which find application in traditional cases of collusion, will not find application here thus raising various legal and ethical challenges.<sup>110</sup>

#### IV THE REGULATORY FRAMEWORK ON PRICING ALGORITHM IN SOUTH AFRICA

In South Africa, the prohibition on the utilisation of pricing algorithms to facilitate, monitor and maintain collusion falls within the scope of section 4(1)(b) of the Competition Act which prohibits restrictive horizontal agreements.<sup>111</sup> Section 4 of the Competition Act regulates the conduct of competing firms, that is, firms in a horizontal relationship. The economic rationale behind this regulation is the recognition that instead of competing vigorously with one another, profit-maximising firms may have an incentive to co-ordinate their behaviour.<sup>112</sup> The incentive lies in the fact that through co-ordination, firms are indirectly capable of acting as a monopolist within their relevant market, whereby prices can be increased or output may be reduced, with the ultimate gain being each firm earning higher profits.<sup>113</sup> In effect, co-ordination enables a number of competitors to collectively increase, exercise and exploit the market power which they would not be able to do individually and is therefore often to the detriment of consumers.<sup>114</sup> Section 4(1) reads as follows:

‘(1) An agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if:

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<sup>108</sup> Pošćić op cit note 17 at 1022.

<sup>109</sup> Nicolas Petit ‘Antitrust and Artificial Intelligence: A Research Agenda’ (2017) 8(6) *Journal of European Competition Law and Practice* 361 at 361.

<sup>110</sup> Ezrachi & Stucke op cit note 35 at 1783.

<sup>111</sup> Competition Commission op cit note 2 para 3.2.3.

<sup>112</sup> Minette Neuhoff, Marylla Govender, Martin Versveld & Daryl Dingley *Practical Guide to the South African Competition Act* 2ed (2017) at 74.

<sup>113</sup> Ibid.

<sup>114</sup> Ibid.

- (a) It has the effect of substantially preventing or lessening competition in a market, unless a party to the agreement, concerted practice, or decision can prove that any technological, efficiency or other pro-competitive gain resulting from it, outweighs that effect; or
- (b) It involves any of the following restrictive horizontal practices:
  - (i) directly or indirectly fixing a purchase or selling price or any other trading condition;
  - (ii) dividing markets by allocating market shares, customers, suppliers, territories or specific types of goods or services; or
  - (iii) collusive tendering.’

In order establish a contravention of the Act, it must first be determined whether or not the parties in question are in a horizontal relationship. In other words, it must be established that the parties are competitors. Although the term ‘competitor’ is not defined in the Act, firms are generally regarded as competitors if, ‘they compete in the same market in respect of the same or interchangeable or substitutable goods or services.’<sup>115</sup> Simply put, firms are competitors where they operate in the same supply chain.<sup>116</sup> Of importance is the fact that ‘competitor’ is understood to include not only actual competitors but also potential competitors.<sup>117</sup> Here, a potential competitor is a competitor that has the necessary means to enter the relevant market within a relatively short period of time.<sup>118</sup>

Should the firms be regarded as competitors, it must then be established that either an agreement or concerted practice exists. In terms section 1(1) of the Act, an agreement is defined as a contract, arrangement or understanding irrespective of whether it is legally enforceable whereas a concerted practice may be defined as co-operative or coordinated conduct between firms, achieved through direct or indirect contact that replaces independent action but which does not amount to an agreement. The case of *Netstar* elaborated on these definitions, holding that although the definition of agreement is not limited to a contractual arrangement, it is

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<sup>115</sup> *American Soda Ash Corporation, CHC Global (Pty) Ltd v Competition Commission of South Africa, Botswana Ash (Pty) Ltd, The Minister of Trade and Industry* Case No. 12/CAC/Dec 01 para 24.

<sup>116</sup> Luke Kelly, David Unterhalter, Isabel Goodman, Patrick Smith & Paula Youens *Principles of Competition Law In South Africa* (2017) 81.

<sup>117</sup> *Ibid* at 82.

<sup>118</sup> *Ibid*. Depending on the industry, such a period is typically between one and five years.

imperative that some form of a binding arrangement exists between the respective parties.<sup>119</sup> In the case of an agreement, what remains of the utmost importance is that the parties must have reached consensus.<sup>120</sup> In contrast, a concerted practice stems from the conduct of the parties therefore rendering the focus on the conduct (instead of the consensus) of the parties when ascertaining whether or not said parties are acting in concert.<sup>121</sup> Importantly, it follows that the absence of an arrangement between the parties or any shared belief that the parties are obliged to act in a particular manner is immaterial.<sup>122</sup>

According to Wallis, AJA, writing for the majority in *Netstar*, it is imperative to an appropriate analysis of alleged anti-competitive conduct that the distinction between a concerted practice and an agreement is properly observed due to the fact the evaluation of evidence is different.<sup>123</sup> In the case of an agreement, the evidence focuses on the whether or not an agreement has been concluded thereby establishing the existence of consensus between the parties.<sup>124</sup> However, in the case of a concerted practice, the evidence pertains to the nature of the conduct of the firms who are alleged to be party to the practice.<sup>125</sup>

If it is found that the firms in question are competitors and the existence of an agreement or concerted practice is established, then the conduct must be characterised. The notion of characterisation was imported into law in the case of *ANSAC*, where the Supreme Court of Appeal (‘SCA’) held that when it comes to establishing whether conduct complained of is to be regarded as a *per se* violation of the Act, the essential enquiry remains the same:

‘It is to establish whether the conduct complained of coincides with the character of the prohibited conduct and this process necessarily embodies two elements. One is the scope of the prohibition: a matter of statutory construction. The other is the nature of the conduct complained of: this is a factual enquiry. In ordinary language this can be termed “characterising” the conduct.’<sup>126</sup>

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<sup>119</sup> *Netstar (Pty) Ltd and Others v Competition Commission of South Africa and Another* 2011 (3) SA 171 (CAC) para 25 (Hereafter referred to as ‘Netstar’).

<sup>120</sup> *Ibid.*

<sup>121</sup> *Ibid.*

<sup>122</sup> *Ibid.*

<sup>123</sup> *Ibid* para 26.

<sup>124</sup> *Ibid.*

<sup>125</sup> *Ibid.*

<sup>126</sup> *American Natural Soda Ash Corporation and Another v Competition Commission and Others* 2005 (3) All SA 1 (SCA) para 47 (hereafter referred to as ‘ANSAC’).

In the case of *Competition Commission v South African Breweries*,<sup>127</sup> the Competition Appeal Court ('CAC') extensively discussed the doctrine of characterisation when grappling with the facts at hand. Although the facts are not important for purposes of this paper, what is significant is that when coming to its conclusion, the CAC took into account the 'true economic nature of the relationship [between the parties] which the characterisation principle seeks to unlock.'<sup>128</sup> In essence, the purpose of characterising conduct in instances of alleged contraventions of section 4(1) is to ensure that the conduct in question is assessed in accordance with the correct section of the provision i.e. in accordance with either section 4(1)(a) or section 4(1)(b).<sup>129</sup>

At the risk of repetition, once properly characterised, the conduct complained of will either fall within the scope of section 4(1)(a) or section 4(1)(b). Should the conduct be characterised as an agreement or concerted practice that amounts to price fixing, market allocation or collusive tendering, it will amount to cartel conduct and is thus regarded as a contravention of section 4(1)(b). Such a contravention is regarded as a *per se* offence whereby the cartelists cannot rely on any technological, efficiency or other pro-competitive gains due to the fact that cartels are regarded as one of the most egregious contraventions of competition legislation worldwide.<sup>130</sup> In effect, section 4(1)(b) of the Act assumes that competition will undoubtedly be harmed whenever a cartel exists since cartels are 'presumptively harmful and no evidence that they may not be, is permitted.'<sup>131</sup> If the conduct does not amount to cartel conduct, it will then presumably be assessed in accordance with section 4(1)(a) of the Act – the rule of reason prohibition. In terms of this section, the relevant parties may raise a defence in respect of their conduct by proving that any technological, efficiency or other pro-competitive gain resulting from it, outweighs the effect of substantially preventing or lessening competition in a particular market.<sup>132</sup> Although there is a plethora of jurisprudence surrounding section 4(1)(b), section 4(1)(a) to date, has only been discussed in the *Netstar* case and does not seem to find much application within the realm of restrictive horizontal practices.

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<sup>127</sup> *Competition Commission v South African Breweries Limited and Others* 2015 (3) SA 329 (CAC) (hereafter referred to as 'SAB').

<sup>128</sup> *Ibid* para 43.

<sup>129</sup> *Ibid* para 44.

<sup>130</sup> Kelly *op cit* note 116 at 86.

<sup>131</sup> *Ibid*.

<sup>132</sup> *Ibid* at 95.

Since the focus of this paper is on pricing algorithms, section 4(1)(b)(i) of the Act finds direct application due to the fact that it prohibits price fixing. The court in *ANSAC*, when speaking to characterisation within the context of price fixing, stated that price fixing involves collusion between rivals in order to supply their respective goods or services to the market, with the intention of stifling competition by secretly agreeing, in some form, to fix their respective prices.<sup>133</sup> Importantly, the court went further, holding that:

‘while pricing fixing inevitably involves collusive or consensual price determination by competitors, it does not follow that price fixing has necessarily occurred whenever there is an arrangement between competitors that results in their goods reaching the market at a uniform price. The concept of “price fixing,” both in lay and statutory language, may, for example be limited to collusive conduct by competitors that is a designed to avoid competition, as opposed to conduct that merely has that incidental effect.’<sup>134</sup>

To this end, it is important to recognise that while our law recognises tacit collusion in accordance with legal terminology (an agreement or concerted practice does not need to necessarily be express), our law at present does not prohibit collusion that is regarded as tacit by economists.<sup>135</sup> This type of ‘collusion,’ also known as oligopolistic price co-ordination or conscious parallelism, refers to instances where independent oligopolists are invariably interdependent to the extent that they have to align their conduct with reference to their peers.<sup>136</sup> Of significance is the fact that tacit collusion does not involve any direct or indirect communication between competing firms despite the softening of competition through some degree of mutual understanding between the relevant firms.<sup>137</sup> Accordingly, tacit collusion is not caught by section 4 of the Act.<sup>138</sup>

With that being said, section 10A of Competition Amendment Act 18 of 2018 (The Amendment Act) which was signed into law on 13 February 2019 but has yet to come into effect, empowers the Competition Commission to investigate complex monopoly conduct and

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<sup>133</sup> Supra note 126 paras 48-49.

<sup>134</sup> Ibid.

<sup>135</sup> Phillip Sutherland & Katherine Kemp ‘Concertation: Agreement, concerted practice or decision by an association’ *Competition law of South Africa* para 5.4.

<sup>136</sup> Ibid.

<sup>137</sup> Kelly op cit note 116 at 94.

<sup>138</sup> Ibid.

thus extends the section 4 prohibition of certain horizontal agreements and concerted practices, to include tacit coordination in circumstances where concentrated markets exist.<sup>139</sup> It follows that under section 10A, the Competition Commission will not only be empowered to investigate a market in which it believes that complex monopoly conduct exists but it will be able to apply to the Competition Tribunal for a declaratory order.<sup>140</sup> In order to secure said order, the Commissioner must satisfy the Tribunal that two requirements are fulfilled. First, the Commissioner must not only prove that at least one of the firms implicated in the investigation has a minimum share of 20 percent of the market but it must also be shown that said firm has engaged in complex monopoly conduct.<sup>141</sup> Second, the Commissioner must show that the conduct of the relevant firms has had the effect of increasing the entry barriers for current or potential competitors from that market; the prices are excessive in that market; there is a refusal to supply to competitors; or there is the existence of any other relevant market characteristics which are indicative of coordinated conduct.<sup>142</sup> Should the Tribunal be satisfied that the Commission has established the aforementioned requirements, the Tribunal is empowered to make an order that either prohibits the relevant conduct or in the alternative, impose conditions that will minimise the negative effects of the complex monopoly conduct on the market.<sup>143</sup>

Of significance is the fact that complex monopoly conduct will not be regarded as *per se* prohibited as seen in section 4(1)(b) of the Act.<sup>144</sup> Consequently, the burden of proof for complex monopoly conduct (tacit collusion) will be higher than that which is required for explicit collusion.<sup>145</sup> According to Holland, the Commission's investigation will be burdensome in that it will involve a thorough analysis of the relevant market; a detailed calculation of each of the relevant firm's share in the market as well as a decision as to whether

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<sup>139</sup> Mike Holland, Jannie Rossouw & Jessica Staples 'Focal Point Pricing: A Challenge to the Successful Implementation of Section 10A (Introduced by the Competition Amendment Act)' (2015) 18(3) *South African Journal of Economic and Management Sciences* 396 at 396.

<sup>140</sup> *Ibid* at 403.

<sup>141</sup> *Ibid*.

<sup>142</sup> *Ibid*.

<sup>143</sup> *Ibid*.

<sup>144</sup> *Ibid*.

<sup>145</sup> *Ibid*.

the conduct amounts to conscious parallel conduct, and not merely independent decision making based on each firm's recognition that they have a degree of mutual independence.<sup>146</sup>

## V THE APPLICATION OF THE EXISTING SA FRAMEWORK TO THE FOUR SCENARIOS OF PRICING ALGORITHMS

In order to ascertain the robustness of the Competition Act, particularly section 4(1)(b)(i), within the context of pricing algorithms, the current framework is applied to the four scenarios described above. From the outset, it must be noted that the main problem when applying section 4(1)(b)(i) to the scenarios is that for liability to arise from cartel coordinated conduct, an agreement or concerted practice must be found to exist between those who have engaged in the alleged anti-competitive conduct.<sup>147</sup> The section below illustrates that while scenarios one and two easily satisfy this requirement, the same cannot be said for third and fourth scenarios.

### *a) The Messenger Scenario*

Upon an application of the messenger scenario to the existing SA regulatory framework, it is clear that it falls squarely within the ambit of the Competition Act since it fulfils the two requirements contained in section 4(1)(b)(i). First, there must be an agreement or concerted practice between competitors. According to paragraph 25 of *Netstar*, this requirement will only be met if the parties reach consensus in relation to the cartel conduct. Second, the agreement or concerted practice must have the purpose of either directly or indirectly fixing a purchase price, a selling price or a trading condition. The first requirement of agreement is fulfilled due to the fact that this scenario necessitates the existence of an explicit agreement irrespective of whether it is written or oral.<sup>148</sup> In other words, for this scenario to work, there must be a deliberate and conscious decision by executives of the participating firms to form a cartel which will utilise a pricing algorithm in order to create the cartel and/or make their collusion more effective.<sup>149</sup> With respect to the second requirement, the sole purpose of a cartel in this scenario

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<sup>146</sup> Ibid.

<sup>147</sup> Michal S. Gal 'Algorithmic-Facilitated Coordination: Market and Legal Solutions' (2017) 2 *Antitrust Chronicle* 22 at 27.

<sup>148</sup> Schwalbe op cit note 26 at 572.

<sup>149</sup> Ibid at 596.



would be to fix prices (whether it be direct or indirect) thus rendering this requirement fulfilled. It can therefore be said that the conduct encapsulated by this scenario is *per se* prohibited and is sufficiently captured by the Competition Act.

In light of the fact that the firms are merely using the pricing algorithm as a tool to carry out their intent to fix prices via a traditional cartel, it is apparent that this scenario does not constitute any new type of collusion. To this end, Schwalbe states this scenario nothing new since, ‘cartelists have and always will use any available technology – telephones, email and computer programs – to form cartels.’<sup>150</sup> Maureen Ohlhausen, a Commissioner of the Federal Trade Commission of the USA, succinctly captured this notion when she stated, ‘if the word “algorithm” can be replaced by the phrase “a guy named Bob,” then pricing algorithms can be dealt with in the same way as traditional agreements.’<sup>151</sup> Since the term algorithm can in fact be replaced with the expression ‘a guy named Bob,’ it is evident that in this scenario, no novel competition problems arise which cannot be resolved by the current Competition Act.<sup>152</sup> As a final point, the simplicity of this scenario is evidenced by the *Topkins* case described in Section III(a) of this paper. While it is an American case, it illustrates the fact that the use of pricing algorithms as a collusive tool is not a new type of collusion and is thus sufficiently covered by existing law.<sup>153</sup>

#### *b) The Hub and Spoke Scenario*

While the hub and spoke scenario slightly differs from the messenger scenario, this scenario is also sufficiently captured by section 4(1)(b)(i) of the Competition Act since it meets the two requirements outlined above. With respect to the requirement of ‘agreement or concerted practice,’ the Competition Commissioner will not be able to allege that an agreement between competitors has taken place due to the fact that the agreement(s) in this scenario are between the hub (the algorithmic developer) and the various spokes (the competitors) who are in a vertical relationship.<sup>154</sup> With that being said, the requirement will be met provided that it is

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<sup>150</sup> Ibid at 572-573.

<sup>151</sup> Gal op cit note 21 at 105.

<sup>152</sup> Schwalbe op cit note 26 at 596.

<sup>153</sup> Bernhardt op cit note 62 at 313.

<sup>154</sup>OECD: Directorate for Financial and Enterprise Affairs Competition Committee ‘*Hub-and-Spoke Arrangements – Note from South Africa*’ (4 December 2019).

successfully argued that the spokes are involved in a concerted practice which according to *Netstar*, does not amount to an agreement but instead arises from the parties' conduct.<sup>155</sup> In other words, despite the fact that none of the spokes have an agreement to collude with one another (neither express nor implied), they will still be held liable as cartel members because their conduct of individually entering into agreements with the hub to use the same pricing algorithm with the awareness that the hub will essentially facilitate the cartel, amounts to a concerted practice. Here, it must be remembered that the use of the same algorithm, by itself, is insufficient to lead to a coordinated outcome.<sup>156</sup> In accordance with the line of reasoning adopted by the Competition Tribunal in *National Association of Pharmaceutical Wholesalers*, the Commissioner would have to show that the firms are using the common algorithm as provided by the algorithmic developer, as a mechanism to eliminate price competition.<sup>157</sup>

In light of the fact that the hub is not in a competitive (horizontal) relationship with the spokes, the hub would not be liable for cartel conduct.<sup>158</sup> However, the hub may be liable under section 5(2) of the Act which is an outright prohibition on minimum resale price maintenance (RPM) which falls outside the scope of this paper.<sup>159</sup> With respect to the second requirement, it will be fulfilled in this scenario since the primary purpose of the hub and spoke agreements and the subsequent concerted practice between the spokes is to indirectly fix prices – it is indirect due to the fact that the hub will be the determinant of the price of the particular good or service.

Of note is that the Competition Commission indicated in its 2019 Note to the OECD that:

‘in most cases, the Commission’s approach to a hub-and-spoke arrangement would be to investigate it under the restrictive vertical practices and/or abuse of dominance provision. The reason for this approach is that SA jurisprudence requires the Commission to show or provide ‘meeting of minds or consensus’ in a cartel case. The Commission would rather investigate a case of minimum RPM as opposed to running a cartel case, more in particular if the RPM is backed-up by sanctions on the spokes for non-compliance with the instructions of the hub.’<sup>160</sup>

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<sup>155</sup> Supra note 119 para 25.

<sup>156</sup> Gal op cit note 21 at 113.

<sup>157</sup> *National Association of Pharmaceutical Wholesalers and Others/Glaxo Welcome (Pty) Ltd and Others* 68 IR/Jun 00.

<sup>158</sup> OECD op cit note 154 at 150.

<sup>159</sup> Ibid.

<sup>160</sup> Ibid.

Accordingly, the Commissioner, when faced with the second scenario, may elect to invoke sections 5 pertaining to vertical agreements (as discussed above). Alternatively, the Commissioner may utilise the abuse of dominance provisions contained in sections 8 and 9 of the Act. While these provisions fall outside the scope of this paper, it is evident that the Competition Act is robust enough to tackle collusion by of hub and spoke agreements, whether it be through section 4, section 5 or sections 8 and 9.

*(c) The Predictable Agent Scenario*

Given that under this scenario, no humans are directly involved in the collusive outcome to the extent that it is the pricing algorithms that monitor and react to any price changes performed by the pricing algorithms of other firms and thus create interdependence between the firms, it cannot be said that this scenario falls within the scope of section 4(1)(b)(i).<sup>161</sup> In other words, the autonomy of the algorithms, when making the firm's pricing decisions, means that the requirement of 'agreement or concerted practice' as per section 4(1) will not be met. The reason being that the algorithms do not have a mind and can therefore not be regarded as having conscious intent to consent to the formation and continued use of a cartel, despite the fact that by engaging in parallel conduct, a collusive outcome may be achieved.<sup>162</sup>

As mentioned above, this type of conduct is regarded as tacit collusion or conscious parallel conduct which is not regarded as *per se* prohibited under section 4 of the Act since it does not fulfil the requirement of agreement or concerted practice – by definition, conscious parallelism:

'is the practice of independent pricing in an oligopolistic market by competing firms which realise that attempts at price-cutting usually have the result of reducing revenue, without also increasing any firm's market share but that simple price leadership in such a market can mutually increase all competitors' revenues. *The striking feature of conscious parallelism is that there is no agreement or understanding between competitors to conduct themselves in a*

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<sup>161</sup> Schwalbe op cit note 26 at 573 & 597.

<sup>162</sup> Gal op cit note 21 at 107.

*parallel fashion*. Rather and very importantly, it involves a unilateral response to the conduct of a firm's competitors.'<sup>163</sup>

Within the context of this scenario, Gal accurately states that:

'conscious parallelism that results from [pricing] algorithms simply mimicking human conduct, making the same decisions and taking the same actions as humans engaged in lawful conscious parallelism, without further facilitating coordination [does not] constitute an agreement.'<sup>164</sup>

It follows, that for this type of conduct to fall within the ambit of section 4, the concept of agreement not only needs revisiting but needs to be widened to include such behaviour.<sup>165</sup> It has long been a contentious debate among scholars whether conscious parallel conduct should be regarded as legal or not.<sup>166</sup> While an in-depth discussion of this debate falls outside the scope of this paper, it is particularly unnecessary to explore the debate here with the introduction of section 10A of the Competition Amendment Act.<sup>167</sup> This section, which empowers to Commissioner to investigate complex monopoly conduct, extends the prohibition of certain horizontal conduct to include tacit coordination, over and above an agreement or concerted practice.<sup>168</sup> Accordingly, this section renders the Competition Act robust enough to resolve collusion that arises out of this scenario. With that being said, complex monopoly conduct will not be regarded as *per se* prohibited.<sup>169</sup> As a result, the burden of proof that the Commissioner must discharge when alleging tacit collusion will be significantly higher than that which is required for explicit collusion. This issue is further exacerbated by the fact that there are still serious problems pertaining to the detection and verification of algorithmic collusion.<sup>170</sup>

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<sup>163</sup> Ann Boniwell & Kriska-Leila Goolabjith 'The contentious concept of conscious parallelism' (2013) 13 (7) *Without Prejudice* 64 at 65.

<sup>164</sup> Gal op cit note 21 at 106.

<sup>165</sup> Schwalbe op cit note 26 at 599.

<sup>166</sup> OECD op cit note 22 at 36-39.

<sup>167</sup> This section is signed into law but does not yet have effect.

<sup>168</sup> Holland op cit note 139 at 396.

<sup>169</sup> *Ibid*.

<sup>170</sup> Schwalbe op cit note 26 at 599.

*(d) The Digital Eye Scenario*

Taking into account the fact that for liability to arise from coordinated conduct, an agreement or concerted practice must be found to exist between those who have engaged in the alleged anti-competitive conduct,<sup>171</sup> it cannot be said that this scenario is captured by section 4(1)(b)(i). In this scenario, as posited by Ezrachi and Stucke, the pricing algorithms collude with one another, without any human intervention at all. Since algorithms do not have any a mind and therefore cannot have intent, it is impossible for them to enter into an agreement in accordance with *Netstar*. The court in *Netstar* held that despite the fact that the definition of an agreement extends beyond a contractual arrangement, ‘what is required is still a form of arrangement that the parties regard as binding upon themselves and other parties to the agreement.’<sup>172</sup> In light of the fact that algorithms are not yet capable of achieving the requisite intent to the extent that they have not yet learnt to communicate with one another sufficiently enough to reach a collusive agreement of some form, they cannot be said to possess the capability to enter into an agreement.<sup>173</sup> Similarly, algorithms are not capable of acting in concert at present due to the fact that they are not able to arrive at an arrangement that will bind them, whether it be contractually or by virtue of a commercial interest or moral suasion for the same reasons outlined above.<sup>174</sup> To this end, Schwalbe investigates this scenario at length, coming to the conclusion that at present, it is doubtful that algorithms will collude in such cases, given the complex dynamics of the world markets.<sup>175</sup>

It follows that despite the fact that the Commissioner will not be able to capture the type of collusion described in the Digital Eye Scenario, this problem seems to belong within the realm legal science fiction.<sup>176</sup> As accurately stated by Schwalbe:

‘Given the current state of research on AI and machine learning, concerns about the collusion of algorithms do not currently seem justified. Considering rapid progress as such research,

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<sup>171</sup> Gal op cit note 147 at 27 .

<sup>172</sup> Supra note 119 para 25.

<sup>173</sup> Schwalbe op cit note 26 at 596.

<sup>174</sup> Supra note 119 para 25.

<sup>175</sup> Schwalbe op cit note 26 at 596 & 600

<sup>176</sup> Ibid at 600.

however, it cannot be ruled out that algorithms may learn to communicate and to behave collusively in the future, even in dynamic and complex environments.<sup>177</sup>

In essence, the current Competition Act would not be able to capture this scenario due to the fact that pricing algorithms are not yet at a point where they can act autonomously. In saying that, this should not be of major concern to the Competition Authorities since this type of collusion, at present, falls within the realm of legal sci-fi. To illustrate this point, it must be recognised that to date, there has not been any case in the world, in which autonomous algorithms have learned to coordinate their price-setting decisions, thereby achieving tacit collusion.<sup>178</sup>

## VI CONCLUSION AND RECOMMENDATIONS

This paper, through an in-depth discussion of pricing algorithms and their potential to facilitate collusion, has demonstrated that the Competition Act and current South African competition policy is, to a large extent, robust enough to withstand the effects of digitalisation. Although the collusion described in the Digital Eye scenario will not fall within the scope of the Competition Act or the Competition Amendment Act, it is advised that the South African lawmakers do not act in haste to remedy this issue in light of the fact that the type of collusion, at present, remains within the realm of legal sci-fi. It must, however, be borne in mind that the rapid rate at which pricing algorithms are being used and developed, may render it necessary for Parliament to address this issue through legislation in the future.<sup>179</sup>

With that being said, the messenger scenario, the hub and spoke scenario and the predictable agent scenario illustrate that section 4(1)(b)(i) is robust enough to tackle these collusive scenarios that come about through the use of pricing algorithms and where it is not, there are other sections of the Act and the Amendment Act that address these shortcomings. In particular, sections 5, 8 and 9 of the Act ensure that the vertical agreements concluded between the hub and the spokes in the third scenario, will be regarded as *per se* prohibited in accordance with section 5(2) of the Act and sections 8 and 9 will ensure that the hub is not abusing any dominant position that it may hold over the spokes. Moreover, section 10A of the Amendment

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<sup>177</sup> Ibid at 770.

<sup>178</sup> Ibid at 596.

<sup>179</sup> Ezrachi & Stucke op cit note 35 at 1801.

Act, although not yet in effect, empowers the Commissioner to investigate complex monopoly conduct thus ensuring that the conscious parallelism described in the Predictable Agent scenario, will fall within the ambit of the Competition regime.

To this end, the OECD's assertion in their handbook on competition policy in the digital age is correct, stating that:

‘Many of the core principles, analytical concepts and areas of concern continue to be relevant [in competition law]. However, authorities will need to be on the lookout for new forms of misconduct and new tools for detection and analysis. At the same time, there is growing consensus that some concerns cannot be addressed under current enforcement frameworks, either because they do not apply, or they may not be effective in rapidly changing markets.’<sup>180</sup>

In conclusion, Ezrachi and Stucke are correct in their assertion that, ‘We are shifting from the world where executives expressly collude in smoke-filled hotel rooms where pricing algorithms continually monitor and adjust to each other's prices and market data.’<sup>181</sup> However, it must be recognised that South Africa's competition toolkit is more robust than not when it comes to tackling collusion – even collusion that is facilitated or comes about through the use of pricing algorithms.

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<sup>180</sup> OECD *‘Handbook on Competition Policy in the Digital Age’* (2022).

<sup>181</sup> Ezrachi & Stucke op cit note 35 at 1775.

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