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# APPLICATION OF BEHAVIORAL ACCOUNTING: HEURISTIC THINKING IN INVESTMENT DECISION-MAKING BY CRYPTOCURRENCY INVESTORS

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**ABSTRACT**
This study aims to examine the impact of heuristic involvement on the behavior and decisions of cryptocurrency investors. The study employs an interpretivism paradigm with a qualitative approach to understand the perspectives of both beginner and experienced cryptocurrency investors, using interviews, observations, and document analysis. Four cryptocurrency investors participated in the study. Interviews were conducted three times a week, while observations followed a semi-structured format to gather in-depth insights from four investors. Document analysis complemented the findings by reviewing relevant literature on the impact on investment behavior. Data collection included non-participant observations of investor behavior and decision-making habits, interviews that explored the factors influencing these decisions, and an analysis of documents, including previous research on heurism biases. Heuristic representativeness is a useful tool to predict the development of cryptocurrencies in the long term to a certain extent.

## INTRODUCTION

As the times develop, in addition to the development of technology, investment instruments also follow developments, which were initially in the form of physical began to be digitized. This indirectly forces people who make investments, or commonly called investors, to start changing their investment habits. Where in this day and age, it is very easy to meet an investor who invests in stocks, forex, cryptocurrencies, and so on. At this time, many people have begun to pay attention and even have an interest, in cryptocurrencies or what we usually call cryptocurrencies such as Bitcoin, ETH, and many more. Many investors who previously ignored cryptocurrency began to invest in this investment instrument. Although cryptocurrency has a price or value that can be said to be very volatile, this does not reduce the desire of investors to invest in this cryptocurrency itself (Baur & Dimpfl, 2021; Ben & Xiaoqiong, 2019; Dahham & Ibrahim, 2020; İçellioğlu & Öner, 2019; Mattke et al., 2019). However, it is also necessary to be aware that in investing in cryptocurrencies itself there are factors that need to be considered as well apart from the analysis carried out by investors. This factor is the heuristic thinking that they do both consciously and unconsciously.

It is undeniable that cryptocurrencies, although they have considerable risks, also generate large returns. However, keep in mind that with a large return is always accompanied by high risk. Therefore, investors must learn the basics of technical analysis and fundamental analysis first before investing. In addition to the high level of return and risk, the thing that investors need to know and be aware of is the legality of the use of this cryptocurrency itself (Nasir et al., 2020). Reporting from the CNBC Indonesia website, it can be known that cryptocurrencies have been legalized in Indonesia, but only as an investment tool, not a means of payment for buying and selling transactions. In addition, it is also

reported from the Liputan6.com website that there are 13 companies or prospective physical traders of crypto assets and 229 crypto assets that have been registered with Bappebti.

Cryptocurrency is supported by Blockchain technology, so cryptocurrency does not require a third party to carry out its transactions, and all transactions carried out will be transparent (Bhiantara, 2018). In this case, it means that cryptocurrencies are greatly influenced by the existing supply and demand, because there is no third party monitoring the transaction (Ghosh et al., 2020; Hairudin et al., 2022; Ilk et al., 2021; Mikhaylov, 2020; Saleh et al., 2020). In addition, if we talk about supply and demand, of course, it will be related to the interests or behaviors of the investors themselves. Because of this, of course, we should study behavioral accounting, especially heuristic thinking, which exists in cryptocurrency investors themselves.

This study is a descriptive research that aims to examine the impact of heuristic involvement on the behavior and decisions of cryptocurrency investors. This study wants to see if the heuristic nature that exists in investors has a significant effect on their actions when investing. This research has benefits for science, researchers, and investors. For science, this research helps to understand the extent to which heuristic thinking influences investment attitudes and decisions. Researchers are expected to gain a deeper understanding of the impact of the heuristic on cryptocurrency investors, while investors can improve their insights regarding biases that arise when investing. The scope of the study includes all cryptocurrency investors, both beginners and experienced.

## METHODS

This research adopted an interpretivism paradigm with a qualitative approach to understand the perspectives of both beginner and experienced cryptocurrency investors. The study employed three qualitative methods: interviews, observations, and document analysis, to explore how heuristic thinking affected behavior and investment decisions. Observations were conducted three times a week, while interviews followed a semi-structured format to gather in-depth insights from four cryptocurrency investors. Document analysis complemented the findings by reviewing relevant literature on the impact of heuristics on investment behavior.

Data collection included non-participant observations of investor behavior and decision-making habits, interviews that explored the factors influencing these decisions, and an analysis of documents, including previous research on heuristic biases. To ensure data validity, triangulation was applied, comparing findings from interviews, observations, and document analysis. In cases of discrepancies, additional data were collected to clarify results. The research schedule spanned from April to October, aiming to provide a comprehensive understanding of the role of heuristic thinking in cryptocurrency investment behavior.

## RESULTS

### Heuristic Nature of Investors

When discussing investment, the focus naturally extends to investors. Investors typically diversify their investments across various types, such as stocks, cryptocurrencies, forex, and more. This study focuses specifically on investors who invest in cryptocurrencies.

The behaviors of cryptocurrency investors, particularly the heuristic tendencies that arise, will be explored based on interview results. As highlighted in the previous chapter's general overview, the behavior of each investor shows significant differences, especially in the dominant heuristic traits. Additionally, the differences between individual investors present intriguing areas for deeper investigation.

#### *Heuristic Nature in Investor R*

As explained in the previous chapter, several internal and external factors influence the application of heuristic thinking by investors. Based on the general description above, the factors described differ significantly from one investor to another, revealing variations in investment behavior.

For investors V and R, external factors include recommendations or suggestions from friends and analysts they trust. Internal factors consist of their own analysis and feelings, as well as the availability of funds. These factors naturally lead to differences in their investment actions, particularly in cryptocurrency.

In R's case, based on the interview results and observed behavior, while R claims to rely more on internal factors, there is a notable reliance on external recommendations from friends when making investment decisions. R tends to invest in coins recommended by friends without thoroughly analyzing fundamentals or charts, which reflects the halo effect. This repeated behavior may prevent R from achieving optimal investment outcomes. Additionally, R's reliance on recommendations suggests the presence of the availability heuristic.

Aside from following recommendations, R sometimes makes independent decisions based on news or cryptocurrency charts. However, R's decision-making often depends on recent data, reflecting the representativeness heuristic, where confidence is derived from past trends. Despite this, R tends to oversimplify data analysis, which can result in biases like misconceptions of chance. Although other biases from representativeness heuristics are less visible, R's strong reliance on friends' recommendations suggests a significant influence of external opinions over data-driven decisions.

This reliance on external recommendations, combined with misconceptions about the influence of external figures, such as the impact of Elon Musk on DOGE, introduces biases like overconfidence and anchoring. R often expects coins to increase in value, even when data suggests otherwise, demonstrating an overconfidence bias. Furthermore, R's focus on friends' recommendations rather than data indicates anchoring bias, where attention is disproportionately placed on a single, less significant factor.

R's decisions are also influenced by emotional factors, leading to positive illusions, where optimism overrides factual analysis. Even when facing negative data, R maintains confidence in future coin increases, akin to a gambling mindset. This positive illusions bias may lead to either profits or, more likely, significant losses if market trends contradict R's beliefs.

Overconfidence, anchoring, and positive illusions typically occur together. Overconfidence fosters a positive outlook on future outcomes, leading to anchoring and positive illusions biases. These biases collectively impact R's investment behavior, emphasizing the importance of data-driven decision-making over external influences and emotional factors.

***Heuristic Nature in Investor V***

On the other hand, for investor V, by paying attention to the behavior and answers from the interviews that have been conducted, it can be said that V emphasizes more on internal factors: "*Lek untuk investasi baik pas pengambilan keputusan maupun apa yang aku lakukan kedepannya gitu ya, paling yang sangat mempengaruhi ya mek internal sih jon. Mosio ada eksternal sisan mek gk seberpengaruh itu.*"

V's behavior and decision to focus more on internal factors is considered a positive step toward becoming a successful investor. However, V explained that the most influential internal factor is the feeling he has: "*Kalau untuk yang paling berpengaruh ya feeling lek aku.*"

This reliance on feelings cannot be said to be entirely beneficial. If an investor depends too much on feelings without considering the available data, profits may not be maximized, and losses could occur. Moreover, V tends to make short-term investments in cryptocurrency, which is known for its volatile price movements.

By relying heavily on feelings, V may experience positive illusions, where he remains optimistic about future investments based on these emotions. Even though this approach makes V bolder in investing, as observed, most of his investment activities do not yield short-term profits, forcing him to hold onto his crypto coins. This shift from short-term to long-term investments leads to missed opportunities for maximizing returns.

Additionally, V demonstrates anchoring bias by consistently relying on his feelings before making investment decisions. This bias, not based on actual cryptocurrency movements, leads to another bias—overconfidence. V believes his investment activities are sound and continues to rely on his feelings. This overconfidence prevents V from making professional decisions, such as knowing when to cut losses or take profits. For example, V predicted that SHIB, a cryptocurrency currently on a decline and moving sideways, would significantly increase in value next year, despite no supporting news or chart trends. This illustrates the overconfidence and positive illusions that hinder V's investment activities.

When asked why V relies solely on feelings, he explained that he was unaware of sites that provide information on cryptocurrencies and did not seek out fundamental data on his investment

coins: " *Aku gk nemu soal e Jon seng buat info-info gitu, kayak aku mek liak di info di app Binance iku mek yo sampe situ tok. Lek berita-berita yo aku gk pernah liak jadi ya meh piye hahaha.*"

***Heuristic Nature in Investor F***

From the presentation of the two investors above, we will next discuss investor F. Here he explained that internal factors are his biggest consideration while investing in *cryptocurrencies*,

" *Wah, lek iki aku rada susah seh jon ngomong e soal e kan ya tergantung sikon. Misal berita ne ngomong e koin ini bakalan jatuh mosok ta ambil ? kan ya gk to. Tapi gk isa kita ngelupakno faktor internal e dewe dari kita, soal e kan kita ya harus analisis dewe ben yakin to, nah lek aku bee lek disuruh milih aku sek bergantung mbe sisi internal ku seh. Soal e kadang aku nrima berita kayak gitu ya, tapi ntar pas ta analisis ama ta tungguin ya isa ae beda*."

From the presentation that has been given, we can know that F himself focuses more on the analysis he does. Of course, as long as I pay attention, I see the properties of availability heuristic and representativeness heuristic. The emergence of this heuristic availability property is because sometimes he invests by remembering previous events that have occurred,

*"Aku iki ae paling masuk DOGE lagi Jon, soal e Elon lak kape ultah jadi pasti naik value e koin DOGE iki, kan DOGE isa naek karena Elon yaan kapan ane."*

With this presentation, the nature of the heuristic availability in F itself has been very visible. However, it should be noted that simplification of the use of availability heuristic will also cause biases such as ease of recall. Indeed, when Elon Musk touted DOGE, the value of the coin also increased and it became quite a trending topic among crypto investors. Of course, this makes it easier for F to remember the incident when he wants to invest in DOGE and put his faith there. This of course also causes another bias, namely misconceptions of chance. This is because F believes that the value of the DOGE coin itself will rise when Elon Musk has a birthday, which of course does not necessarily happen, but on the other hand F is sure that it will happen. Even though Elon's action in touting the DOGE coin so that the value of the coin can rise, is a coincidence or a very random possibility. Of course, this will also apply at the time of Elon's birthday, where the value of the DOGE coin itself may not increase, or it may also increase. Here F has misinterpreted this random event which can be fatal in the future.

Apart from the availability of heuristic, F itself also shows the nature of heuristic representativeness, where he will collect both fundamental and technical data before investing. According to my observation, there are no signs of F simplifying the nature of heuristic representativeness which does not give rise to any other bias other than misconceptions of chance. However, beyond these two heuristic traits, there are also biases that arise such as overconfidence, anchoring, and positive illusions. These three biases, as already discussed, can arise due to the influence of a person's emotional situation. The overconfidence bias here can arise due to excessive confidence from F itself, but it is not supported by really solid data. For example, DOGE, a coin that he believes will increase in value if Elon has a birthday, which is really a random event and is not supported by any data. Of course, this will also be a wrong and inappropriate anchor because it is not based on realistic data. Another example, he explained his belief in TKO coins that can experience such a large increase in value at the end of 2021, which does not seem to be possible in 2021, "*Kan iki aku jangka Panjang to nah yo lek kayak TKO iku aku percaya seh dee isa sampe minim seratusan lah pas akhir tahun iki.*"

In fact, as is well known, cryptocurrency is an investment instrument based on supply and demand and also based on public opinion, so even though the analysis data carried out is indeed supportive for a coin it should be able to go up, but if it is good from supply and demand And public opinion is not so, so of course the coin cannot go up. Here is another factor that causes the emergence of this overconfidence itself, namely because F itself is glued or sticks to the project that will be carried out by the developer of the coin he is investing. Indeed, the basis for holding on is correct, only here the project does not have certainty when it will be carried out, and this of course cannot be an anchor or a strong basis in an investment activity. Apart from that, he also believes that every coin will go up even if it is now falling, which means that this is a bias of positive illusions.

Here the use of the heuristic representativeness property can be considered correct and does not undergo simplification, although there is a bias such as misconceptions of chance, but here in my opinion the bias arises due to the simplification of the availability heuristic property. Of course, this is very unprofitable for F himself, because with the passage of time, it will make the investment activities

of F himself not optimal. Not to mention that F is also influenced by biases that arise because they are too emotional when doing investment activities.

***Heuristic Nature in Investor A***

Then for investor A himself, after conducting interviews and further observations, it can be seen that A himself is more dependent on his internal factors. He even explained that he was not influenced and never listened to recommendations from friends and other analysts, in the sense that he only considered the recommendation as an input that he would reconsider.

"*Ooo kalau aku gk pernah dengerno atau dalam hal ini terpengaruh sama rekomendasi orang lainnya. Ya kudengerin sih tapi itu cuma sebagai saran atau masukan, nah ntar aku analisis dewe terus ya baru keputusan e tetap sesuai aku.*"

With an answer like this, we can see the use of the heuristic representativeness trait. Here I observe that A himself is correct in applying this heuristic representativeness, in other words A does not simplify the use of heuristic representativeness. However, even though the application of this heuristic representativeness has been very good, A himself is still greatly influenced by emotions when investing in cryptocurrencies. This can be seen when I ask further why he is still holding or holding coins that are sideways and have no signs of going up. He explained that he believes in the analysis he does and will definitely not be wrong, besides that A also explained that he can still make a profit by using the average down method,

"*Lah ngapain dilepas yo kan jek iso naek iku, lek aku seh yo percaya ae pasti naek wong analisis e aku dewe seng analisis hahaha. Lagian lek misal e emang turun lo aku biasane masuk beli maneh ben tambah untung, kan lek ngono pake metode average down lek naek ke harga semula ae ws untung aku anggep ane.*"

Here it is very visible that there is overconfidence which is not recommend for cryptocurrencies, because cryptocurrencies are very dependent on random events (such as Elon and DOGE coin), to be able to experience an extraordinary increase in the value of the coin itself. Although relying on analysis is already a good anchor, but once again it needs to be remembered and noted that cryptocurrency is one of the instruments that relies on supply and demand and public opinion. So even though the analysis is showing that the coin is rising or will increase in value, but if the market does not support it, it will still not increase the value of the coin. With this overconfidence, it also causes positive illusions which will greatly affect the results of the investment made by A himself.

Positive illusions also arise in this case because there are side effects of overconfidence bias, namely misconceptions of chance. Where A strongly believes that the coin will increase in value in the future, but here A seems to forget that the event or event that makes the value of a cryptocurrency increase, is a completely random event (such as Elon and DOGE or SHIB).

**Analysis of Heuristic Traits and Arising Biases**

After seeing the explanation of the heuristic traits that appear and their biases, of course we need to look deeper whether this trait is natural or very rare among investors. In the description of the heuristic characteristics of investors, both beginners and those who are quite experienced above, it can be seen that there are a lot of biases that arise along with the use of these heuristic properties. There are even studies that empirically provide information that most investors make decisions in the capital market on the basis of profit information influenced by their psychological heuristics (Praditha, 2019).

***Analyzing Representativeness Heuristic on Cryptocurrency Investors***

The most commonly used heuristic trait observed is heuristic representativeness. This heuristic is considered reasonable because, in general, investors rely on past data to make decisions or respond to investment opportunities. In the context of cryptocurrency investing, past data plays a crucial role, along with cryptocurrency chart analysis. However, oversimplifying the use of heuristic representativeness can lead to biases that negatively impact investment activities (such as in the case of R). If this representativeness bias is not addressed, it can significantly affect rational decision-making for both beginner and experienced investors (Vitmiasih et al., 2021). The more this bias is left unchecked, the more irrational decisions and behaviors become. Beginner investors are particularly prone to experiencing representativeness bias when making investment decisions (Sina, 2014).

***Analyzing Confirmation Heuristic and Affect Heuristic on Cryptocurrency Investors***

Apart from heuristic representativeness, there is a confirmation heuristic and affect heuristic. More precisely, there is an overconfidence bias, anchoring, and positive illusions that are so thick in the decision-making and behavior of cryptocurrency investors, both beginners and those who are quite experienced. Investors sometimes believe too much in their abilities and knowledge, in fact, they are very confident in their predictions, which has been proven by analysis conducted by several previous researchers (such as Jannah & Ady (2017), Ar-Rachman (2018), Addinpujoartanto & Darmawan (2020) and many more). The feeling of excessive confidence will make us unable to make rational decisions. This has been shown in the presentations of both beginner investors, as well as investors who are quite experienced. Where they are very confident in their abilities, knowledge, and predictions that in the end after researchers pay attention over time, this overconfidence often hinders their investment activities.

Apart from overconfidence, there will be a previous bias that supports the emergence of this overconfidence. This bias is anchoring. As can be seen in the presentation of the heuristic nature and bias that occurs in investor investment activities, we can see that this anchoring bias is very pronounced in each investor, even though the basis of reference is different. Some refer and place their anchor on an event that should be a random event (such as F), there are also those whose anchor is the feeling of the investor himself (such as V and A), and there are also those who follow and nail their friends around them (such as R).

In general, investors will automatically set an anchor as the basis for initiating their estimates, where later investors will adjust the results of their estimates to be slightly above or below the anchor (Saraswati, 2016). However, in this case, the researcher is a cryptocurrency investor, where they tend to apply the results of the estimate above the anchor.

On the other hand, investors who are experiencing a decline in the value of their investments, will tend to be reluctant to sell them, because these investors have an anchor that the investment performance they have will increase in the future (Charissa, 2018). However, if it is about cryptocurrencies , not selling or cutting losses may be the right action, considering that cryptocurrency is one of the investment instruments that has high fluctuations, and is greatly influenced by supply and demand.

***Analyzing Availability Heuristic on Investor Cryptocurrency***

Of the three prominent heuristic traits that have been described above, there are also heuristic traits that are not too prominent but also exist in the interviewed investors, namely availability heuristic. Here it can be seen that the lack of financial literacy will make investors consider information from their close friends and relatives more as a reliable reference to use in investment decisions, thus giving rise to and increasing the use of this availability heuristic (Kasoga, 2021). However, it can also be seen that apart from recommendations from friends and relatives, there are also investors who have a fairly strong heuristic availability, based only on memories of similar events in the past (investor F). Of course, heuristic availability is quite strong, it will greatly affect the investment activities it does, and usually the influence given is also negative. This is certainly also supported by previous research, where the study stated that heuristic availability is an important factor, which causes investors to make irrational decisions (MENG, 2017).

**Implications of Heuristic Traits on Cryptocurrency Investors**

All of the traits and biases that have been described above will certainly have implications or impacts on cryptocurrency investors in the future. It s just that the implications given will certainly be different according to the application of the heuristic nature. The application of an overly simplified heuristic nature will have adverse implications for the investment activities of such investors, especially cryptocurrency investors. But on the other hand, if the application of the heuristic nature is appropriate and correct without any major simplification, then the implications given will also be good for the investor's investment activities.

***Implication of Representativeness Heuristic***

From the nature of heuristic representativeness, if applied correctly, it will have very useful implications for the development of behavior and decisions when investing. The correct application of heuristic representativeness in cryptocurrencies, it will have very useful implications such as being

able to predict the development of cryptocurrencies in the long term to a certain extent. Of course, although the development of cryptocurrency is a development that can be said to be determined by the supply and demand of the coin itself, but past data and plans from the coin developers themselves that have been planned in advance, will certainly make a contribution to our predictions. For example, the HOT coin, where he has plans for a project that has been announced to the public and will be implemented a few months later, so this has a significant impact on the value of the coin itself.

***Implication of Availability Heuristic***

Heuristic availability has implications that can be considered less profitable and sometimes resemble gambling. This is because memories of past events cannot be directly equated with present circumstances. In the case of cryptocurrencies, which undergo changes every year in terms of graphics and data, relying on memory alone when investing can be problematic. It is important to recognize that data, graphs, and circumstances are constantly changing, which can result in significant differences in the performance of investment instruments, such as cryptocurrencies.

***Implication of Confirmation Heuristic and Affect Heuristic***

For confirmation heuristic and affect heuristic, it has more implications that can be considered quite negative from the researcher's view. This is because these two heuristics focus more on a person's feelings or emotional state. Of course we know that if we invest by relying on emotions, then we are more like gambling than investing. This is due to the fact that if it has been affected by emotional conditions, then a person will tend to make irrational decisions at all. They will tend to feel anxious if their cryptocurrency investment drops drastically, and they also tend to quickly give up or sell their cryptocurrencies just for a small profit.

However, researchers also found that there are studies that can prove that with the emotional participation of investors, there will be a positive impact on the investment decisions made by these investors (Hussain, 2021). Where this opens up a new understanding as well as where the participation of emotions in an investor's investment activities does not always have a bad impact.

**Overall Analysis**

With the explanation that has been explained above, we can know that every use of heuristic thoughts or traits will cause biases that we do not want. This is because either consciously or unconsciously, we will simplify, or it can be said that we underestimate the use of this heuristic.

The use of heuristic traits or thoughts itself is not only one kind. Because of this, the biases that arise are also very diverse. Starting from biases that arise due to the simplification of heuristic representativeness, such as misconceptions of chance that will cause losses in an investor's investment activities in the future, or such as availability heuristics that rely more on memories of similar events in the past, where this will cause an investor to make hasty decisions. Even though we know that the event we remember has data with different variables than the current one, which of course makes the data we remember need to be re-analyzed. However, often an investor only relies on his memory of events in the past, which will be very detrimental to his investment activities.

In addition to these two heuristic thoughts or traits, there are also heuristic thoughts or traits, which are closely related to a person's emotions. These heuristic traits or thoughts are confirmation heuristic and affect heuristic. Because these two heuristic traits or thoughts are closely related to a person's emotions, of course the bias caused can be very detrimental to an investor's investment activities. Of course, these two heuristic traits or thoughts cannot be separated from us, because both a person who is not an investor and an investor, will have emotions that participate in their activities. Especially for an investor, because in their activities in investing they use a lot of emotions, in the sense that the movement up and down from their portfolio will greatly affect their emotions. Especially when talking about cryptocurrencies that have a very high fluctuation value, where this can make investors think irrationally which will put pressure on their emotions.

**CONCLUSION**

A study on cryptocurrency investors revealed that while they apply heuristic traits differently, biases due to simplification can still occur. Beginner investors are more susceptible to biases like heuristic representativeness, while experienced investors rely more on information analysis. Heuristics can have both positive and negative implications depending on their application. If used

correctly, they can aid investment decision-making, but emotionally influenced heuristics can lead to riskier decisions. To reduce bias, financial literacy is crucial, especially in volatile markets. The study's limitations include a lack of references and limited time for interviews, resulting in data saturation. Future research should involve direct tests and interviews until data saturation is reached to better understand heuristic application in cryptocurrency investment decisions.

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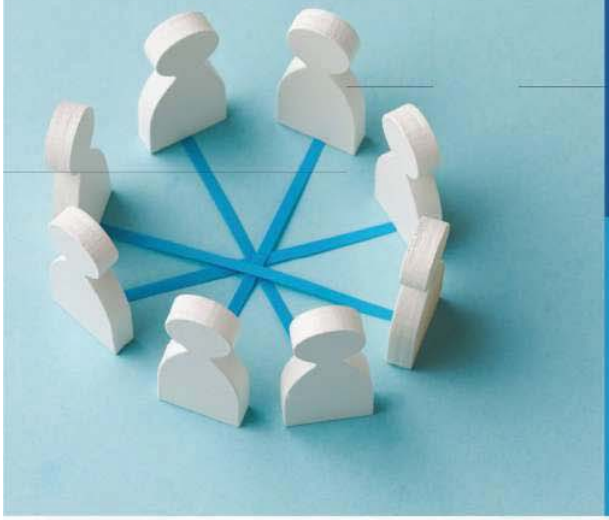

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