

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

KINAXIS INC. and KINAXIS CORP.,
Petitioner,

v.

BLUE YONDER GROUP, INC.,
Patent Owner.

IPR2021-01318
Patent 8,781,868 B2

Before NATHAN A. ENGELS, PAUL J. KORNICZKY, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

DOUGAL, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Petitioner, Kinaxis Inc. and Kinaxis Corp., requests that we institute an *inter partes* review to challenge the patentability of claims 1–20 (the “challenged claims”) of U.S. Patent 8,781,868 B2 (Ex. 1001, “the ’868 patent”). Paper 2 (“Pet.”). Patent Owner, Blue Yonder Group, Inc., argues that Petitioner’s request is deficient and should not be granted. Paper 22 (“Preliminary Response” or “Prelim. Resp.”). With our authorization, Petitioner filed a Reply to Patent Owner’s Preliminary Response (Paper 26, “Reply”) and Patent Owner filed a Sur-reply (Paper 27, “Sur-reply”).

Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we grant the Petition and institute an *inter partes* review.¹

B. *Related Matters*

The parties identify the following related district court litigation: *Blue Yonder Group Inc. v. Kinaxis Inc.*, No. 3:20-cv-03636-K (N.D. Tex.). Pet. 77; Paper 5, 2.

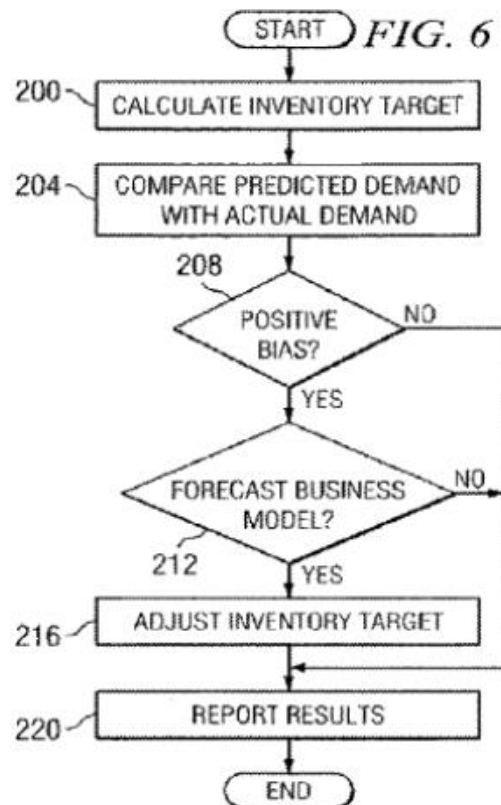
C. *The ’868 Patent*

The ’868 patent is entitled “Determining an Inventory Target for a Node of a Supply Chain.” Ex. 1001, code (54). The ’868 patent explains that “determining the proper amount of inventory [(i.e. the inventory target)] at each node [in a supply chain] may involve predicting the amount of inventory needed at the nodes to satisfy customer demand.” *Id.* at 1:30–33.

¹ Our findings and conclusions at this stage are preliminary, and thus, no final determinations are made.

The '868 patent further explains that it is important to maintain sufficient inventory to enable the production process or costly delays could occur; but, purchasing and holding inventory can be expensive, and inventory can become obsolete. *Id.* at 4:25–27.

A demand stock and a demand variability stock can be used to calculate an inventory target. *Id.* at 2:36–38. “The demand stock covers mean demand over lead time, and the demand variability stock covers demand variability over lead time,” where lead-time is the time between when an order is placed and when it arrives *Id.* at 2:38–40, 4:10–12. The system also establishes a demand bias, which “refers to the tendency of predicted demand [] to be greater than or less than actual demand.” *Id.* at 6:11–14. Positive bias is when predicted demand is less than actual demand and negative bias is when it is greater than actual demand. *Id.* at 6:14–17. The '868 patent's Figure 6 shows an example involving demand bias:



As shown in Figure 6, the method calculates an inventory target and then establishes whether there is a positive or negative demand bias. *Id.* at 6:7–19. If there is a positive bias and a forecast business model is used, then the inventory target will be adjusted. *See id.* at 6:20–35. If there is a positive bias and a forecast business model is *not* used, the inventory target will *not* be adjusted. *See id.*

Figure 7, reproduced below, illustrates a “method for optimizing an inventory target for a node of a supply chain.” *Id.* at 2:26–27.

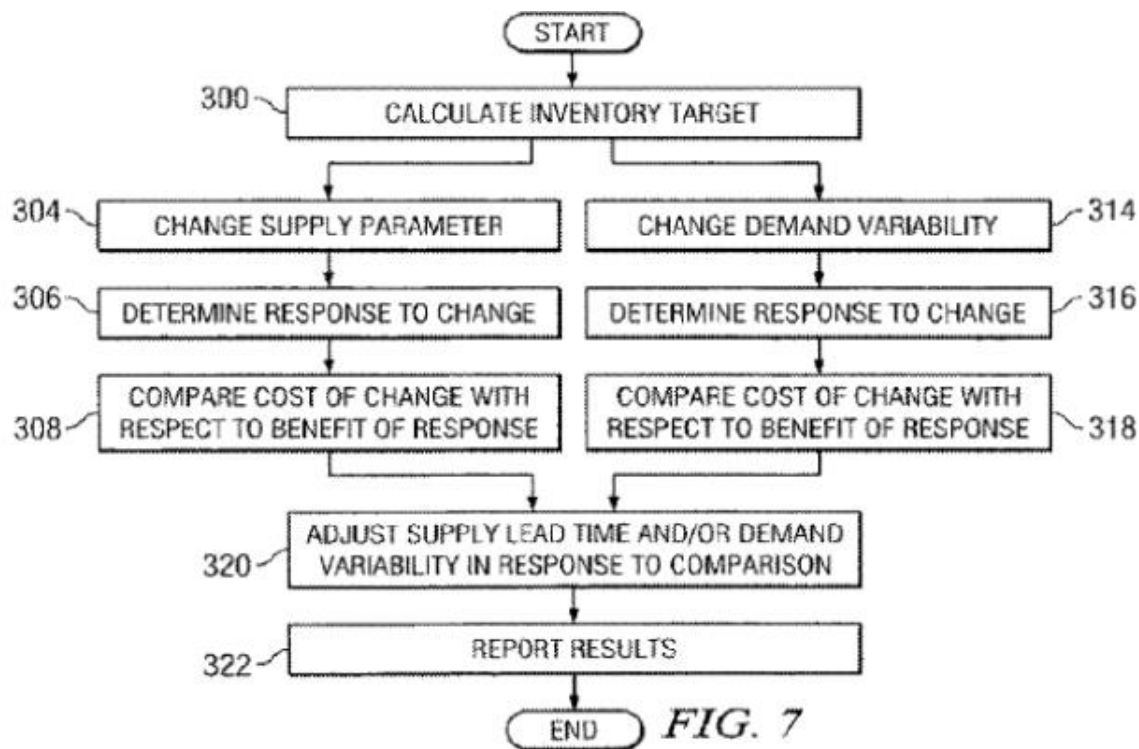


Figure 7 shows a method that calculates an inventory target and then changes a supply parameter. An example of changing a supply parameter is reducing the lead-time by selecting a faster delivery option. *See id.* at 6:56–7:3. This reduction in lead-time, however, may have associated costs, such as a higher delivery fee. *See id.* It may also have associated benefits, such as reduced demand stock (and thus reduced holding costs), as faster delivery

means that less inventory is needed at the nodes. *See id.* If the benefit of the change outweighs the cost, the supply parameter is adjusted. *See id.*

D. Illustrative Claim

Petitioner challenges claims 1–20 of the '868 patent. Of the challenged claims, claims 1, 9, and 15 are independent and claim 1 is illustrative:

1. A method of optimizing a supply chain parameter of a node of a supply chain, comprising:

calculating, by a computer, an inventory target for a node of a supply chain; by:

calculating a demand stock that satisfies a demand over supply lead time at a node of the supply chain;

calculating a demand variability stock that satisfies a demand variability of the demand over supply lead time at the node;

establishing the demand bias of the demand at the node; and

determining the inventory target of the node based on the demand stock and the demand variability stock in accordance with the demand bias;

changing, by the computer, a supply parameter associated with the node, the change in the supply parameter associated with a supply parameter cost or a supply parameter benefit;

adjusting, by the computer, the supply parameter associated with the node, when the benefit of the supply parameter exceeds the cost of the supply parameter; and

adjusting, by the computer, the inventory target of the node based on the adjusted supply parameter.

Ex. 1001, 7:62–8:18.

II. ANALYSIS

A. *Summary of Issues*

In the below analysis, we first address the grounds of unpatentability. We then address whether we should discretionarily deny the Petition.

B. *Grounds of Unpatentability*

Petitioner asserts the following grounds of unpatentability (Pet. 1), supported by the declaration of Dr. Stephen C. Graves (Ex. 1003):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 3, 9, 15	103(a) ²	Graves, ³ Winqvist ⁴
2, 4, 8, 10, 14, 16, 20	103(a)	Graves, Winqvist, Coyle ⁵
6, 12, 18	103(a)	Graves, Winqvist, Coyle, MIT ⁶
5, 11, 17	103(a)	Graves, Winqvist, Schroeder ⁷
7, 13, 19	103(a)	Graves, Winqvist, Coyle, Schroeder
1, 3, 9, 15	103(a)	Agarwal, ⁸ Liao ⁹
2, 4, 8, 10, 14, 16, 20	103(a)	Agarwal, Liao, Coyle

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. We refer to the pre-AIA version of § 103.

³ Graves, et. al, “Optimizing Strategic Safety Stock Placement in Supply Chains,” *Manufacturing & Service Operations Management*, Vol. 2, No. 1 (Winter 2000) (“Graves”) (Ex. 1007).

⁴ PCT Pub. WO2000/046733, pub. Aug. 10, 2000 (“Winqvist”) (Ex. 1008).

⁵ Coyle, et. al, “The Management of Business Logistics: A Supply Chain Perspective,” (7th ed. 2002) (“Coyle”) (Ex. 1006).

⁶ Davis, “Effective Supply Chain Management” *Massachusetts Institute of Technology Sloan Management Review*, Vol. 34, No. 4 (Summer 1993) (“MIT”) (Ex. 1009).

⁷ Schroeder, “Operations Management: Contemporary Concepts” (1999) (“Schroeder”) (Ex. 1010).

⁸ U.S. Patent Pub. 2003/0101107, pub. May 29, 2003 (“Agarwal”) (Ex. 1004).

⁹ Liao, et. al, “An Analytical Determination of Lead Time with Normal Demand,” *Department of Industrial Management, National Taiwan Institute of Technology, Taiwan* (June 1991) (“Liao”) (Ex. 1005).

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
6, 12, 18	103(a)	Agarwal, Liao, Coyle, MIT
1, 3, 5, 9, 11, 15, 17	103(a)	Agarwal, Liao, Schroeder
2, 4, 7, 8, 10, 13, 14, 16, 19, 20	103(a)	Agarwal, Liao, Schroeder, Coyle
6, 12, 18	103(a)	Agarwal, Liao, Schroeder, Coyle, MIT

C. Legal Standards

Petitioner bears the burden to demonstrate unpatentability. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). At this preliminary stage, we determine whether the information presented in the Petition shows a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims would have been unpatentable. *See* 35 U.S.C. § 314(a).

A claim is unpatentable as obvious under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). We resolve the question of obviousness based on underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the prior art and the claims; (3) the level of skill in the art; and (4) when in evidence, objective indicia of obviousness or nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We apply these principles to the Petition’s challenges.

D. Level of Ordinary Skill in the Art

Petitioner does not provide a level of skill for a person of ordinary skill in the art (“POSA”). *See generally* Pet. However, Petitioner’s declarant states that a POSA:

would have had at least a Bachelor’s degree in industrial engineering, operations research, management science, or applied math, with 2–3 years of experience in supply chain management. The same experience can be obtained through research and study in a graduate program or through comparable exposure to research literature through industry employment working in the field of supply chain management.

Ex. 1003 ¶ 27.

Patent Owner states that it applies the above definition. Prelim. Resp. 11–12.

We are persuaded, on the present record, that Petitioner’s declarant’s proposal is consistent with the problems and solutions in the ’868 patent and prior art of record. We adopt this definition of the level of ordinary skill for the purposes of this Decision.

E. Claim Construction

In *inter partes* review, we construe claims using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2020).

Both parties state that no claim terms need any express claim construction. *See* Pet. 3–4; Prelim. Resp. 11. We agree that no claim term needs to be construed at this stage. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need

only construe terms that are in controversy, and only to the extent necessary to resolve the controversy.” (internal quotation omitted)).

F. Public Accessibility of Non-Patent Literature

Concerning the non-patent literature, the Petition states:

Liao (published 1991), MIT (published 1993), Schroeder (published December 1999, publicly available no later than August 30, 2001), Graves (published 2000), and Winqvist (published August 10, 2000) are prior art under at least §102(b) as printed publications published over a year prior to May 12, 2003. EX1012, ¶¶4-10, 17-27; EX1013, ¶¶2-14; EX1003, ¶47; EX1014. Coyle (published December 2002, publicly available no later than Feb. 13, 2003) is prior art under at least §102(a) as a printed publication published prior to May 12, 2003. EX1012, ¶¶11-16.

Pet. 2.

Patent Owner argues that “[t]he Petition fails [to] establish that the non-patent literature of Liao (EX1005), Coyle (EX1006), Graves (EX1007), MIT (EX1009), and Schroeder (EX1010) are printed publications within the meaning of 35 U.S.C. § 102.” Prelim. Resp. 44. Patent Owner continues: “Petitioner string cites multiple paragraphs from four different declarations as its sole evidence in support of conclusory statements that the non-patent literature . . . qualify as a printed publication within the meaning of Section 102.” *Id.* at 45–46. Patent Owner also states that the Petition does not include “any argument or explanation establishing the public accessibility of these five references.” *Id.* at 46. Thus, Patent Owner argues that Petitioner has not satisfied its burden. *Id.*

“[A]t the institution stage, the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a

printed publication.” *Hulu, LLC v. Sound View Innovations LLC*, IPR2018-01039, 5 (P.T.A.B. Dec. 20, 2019).

We determine that the Petition has satisfied its burden in this regard. For each of the five non-patent literature references, the Petition provides an alleged date of publication. Pet. 2. Further, the Petition provides additional alleged public accessibility dates for two of the references. *Id.* The Petition further identifies four declarations to support its position. *Id.* (citing Ex. 1012 ¶¶ 4–27; Ex. 1013 ¶¶ 2–14; Ex. 1003 ¶ 47; Ex. 1014). Based on our review, these declarations do not appear to be conclusory or unreasonable. We note that other than arguing that the Petition contains “conclusory statements” regarding the non-patent literature, Patent Owner does not appear to contest the testimony contained in these declarations concerning the non-patent literature.

G. 35 U.S.C. § 103(a) – Graves, Winqvist

Petitioner argues that the combination of Graves and Winqvist renders obvious claims 1, 3, 9, and 15. Pet. 45–64. Patent Owner argues against the combination of Graves and Winqvist and also argues that the Petition has not shown that the combination discloses all elements of the claims. Prelim. Resp. 26–44. Patent Owner relies on the Declaration of Douglas J. Thomas, Ph.D., for support. Ex. 2019. For the reasons expressed below, we determine that Petitioner has established a reasonable likelihood of succeeding in showing that claims 1, 3, 9, and 15 are unpatentable.

1. Graves

Graves is an article that addresses the problem of “where to hold safety stock to minimize inventory costs” in “complex supply chains.” Ex. 1007, 1. It presents a framework for “modeling strategic safety stock in a supply chain that is subject to demand or forecast uncertainty.” *Id.* Graves

sets a number of “key assumptions,” including bounded demand, deterministic lead times, and guaranteed service time between every stage and its customers. *Id.* at 1, 3. These assumptions allow Graves “to capture the stochastic nature of the problem and formulate it as a deterministic optimization.” *Id.* at 1.

Graves states that “for the purposes of positioning safety stock, a manager might specify the demand bounds at the demand node by” the following equation:

$$D_j(\tau) = \tau\mu + k\sigma\sqrt{\tau}$$

where “ $D_j(\tau)$ ” is the demand bound for end item “ j ” over a time interval of length “ τ ”, and “ k ” is a safety factor defined as “how frequently the manager is willing to resort to other tactics to cover demand variability.” *Id.* at 4. This is based on the “assumption where demand for end item j is normally distributed each period . . . with mean μ and standard deviation σ .” *Id.*

Graves also provides an equation for base stock “ B_j ” in a single-stage model assuming bounded demand as:

$$B_j = D_j(\tau) \text{ where } \tau = SI_j + T_j - S_j$$

Id. at 6.

Graves explains that

the base stock equals the maximum possible demand over the *net* replenishment time for the stage. The *net* replenishment time for stage j is the replenishment time ($SI_j + T_j$) minus its service time (S_j). At any time t , stage j has filled its customers’ demand through time $t - S_j$, but has only been replenished for demand through time $t - SI_j - T_j$. The base stock must cover this time interval of exposure, namely the net replenishment time.

Id.

2. *Winqvist*

Winqvist is titled “Method for Maintaining an Inventory.” Ex. 1008 code (54). Winqvist describes “a dynamic method of computing [] order quantities simultaneously taking into account safety stocks and safety times” that includes computing “a forecast based safety stock.” *Id.* at Abstract, 1:8–10.

Winqvist recognizes that calculation of a forecast based safety stock can often have errors and therefore proposes first and second corrective factors to increase “the accuracy of the forecasting model.” *Id.* at 6:3–7, 9:2–16. The corrective factors account for “possible error factors caused by sample size and forecast errors.” *Id.* at 16:9–14. Winqvist’s “correction factor 2” accounts for the “degree and bias of accumulated forecast error.” *Id.* at 11:30–12:18. The calculated degree and bias of the forecast error allows forecasting errors of different products to be compared. *Id.* at 12:11–18. Winqvist further teaches, “[f]orecasts should be adjusted to compensate for this bias and safety stock levels reevaluated.” *Id.* at 13:4–28.

3. *Claims 1, 9, 15*

The Petition outlines how the combination of Graves and Winqvist teaches the features of independent claim 1, and then relies on essentially the same discussion for the related aspects of independent claims 9 and 15. Pet. 45–64. Patent Owner similarly addresses all of the independent claims together. *See* Prelim. Resp. 26–44. Thus, we only address claim 1 in our analysis below.

Generally, Petitioner relies on Graves for the majority of the features of claim 1 and on the combination of Graves and Winqvist for the features involving “demand bias.” Pet. 47–60. Patent Owner argues against the combination of Graves and Winqvist and also argues that the Petition has

not shown that the combination discloses all elements of the claims. Prelim. Resp. 26–44.

a) *Demand Stock and Demand Variability*

Claim 1 requires, *inter alia*:

A method of optimizing a supply chain parameter of a node of a supply chain, comprising:

calculating, by a computer, an inventory target for a node of a supply chain; by:

calculating a demand stock that satisfies a demand over supply lead time at a node of the supply chain;

calculating a demand variability stock that satisfies a demand variability of the demand over supply lead time at the node.

Ex. 1001, 7:62–8:3.

Petitioner argues that these elements of claim 1 are taught or suggested by the method of Graves. Pet. 49–53. For example, Petitioner argues that Graves teaches using software applications “for modeling ***strategic safety stock*** in a ***supply chain*** that is subject to demand or forecast uncertainty” to “***optimize[s] the inventory*** in a supply chain.” *Id.* at 49 (quoting Ex. 1003, 1–2) (citing *id.* at 1–2, 10). For calculating an inventory target by calculating demand stock and demand variability stock as claimed, Petitioner relies on Grave’s equations:

$$D_j(\tau) = \tau\mu + k\sigma\sqrt{\tau}$$

$$B_j = D_j(\tau)$$

Pet. 50–53, 55. These same equations as marked-up by Petitioner are reproduced below:

$$D_j(\tau) = \tau\mu + k\sigma\sqrt{\tau}$$

Maximum Demand for period τ

Demand Stock calculation for period τ (mean demand for period τ)

Demand Variability Stock calculation for period τ

$$B_j = D_j(\tau)$$

Base Stock

Maximum demand over replenishment time

Id. at 55.

Petitioner's mark-ups identify how Petitioner compares the equations to the claim language. Petitioner argues that " $\tau\mu$ " is the mean demand for a period of time " τ " which corresponds to the claimed demand stock calculation. *Id.* at 50–52, 55. Petitioner argues that " $k\sigma\sqrt{\tau}$ " includes the "standard deviation [σ] of demand over supply lead time" which corresponds to the claimed demand variability stock calculation. *Id.* at 52–53, 55. Thus, Petitioner argues that Graves' calculation of the base stock " B_j ", which equals maximum demand over replenishment time " $D_j(\tau)$ " corresponds to the claimed calculating an inventory target based on calculating demand stock and demand variability stock. *Id.* at 50, 55.

Of the above claim elements, Patent Owner only contests Petitioner's position that Graves teaches calculating a demand variability stock. Prelim.

Resp. 30–33. Patent Owner agrees that Graves’ equation for maximum demand over replenishment time “ $D_j(\tau)$ ” “includes demand variability, $k\sigma\sqrt{\tau}$,” but argues that “it is not a direct input into the base stock equation [‘ B_j ’].” *Id.* at 32. Patent Owner argues that “Determining the inventory target” “based on the demand variability stock” requires that demand variability be a direct input in the inventory target equation. *Id.* (citing Ex. 1001, 5:55–58, 6:5–7; Ex. 2019 ¶ 53).

However, from a mathematical standpoint, it is not clear why Graves’ standard deviation of demand is not a direct input into the inventory target equation. If under certain conditions:

$$B_j = D_j(\tau);$$

then under those same conditions:

$$B_j = \tau\mu + k\sigma\sqrt{\tau}.$$

Which renders the standard deviation of demand (i.e., demand variability) a direct input into the inventory target. At this stage, we decline to determine whether the claim requires that demand variability be a direct input into the inventory target, but if it does, this requirement appears to be met by the teachings of Graves.

Patent Owner further argues that “a POSA would **not** consider a fixed demand upper bound value to be a characterization of demand uncertainty.” Prelim Resp. 32. By this Patent Owner appears to be arguing that maximum demand over replenishment time “ $D_j(\tau)$ ” would not be considered a characterization of demand uncertainty. However, Patent Owner does explain why “ $k\sigma\sqrt{\tau}$ ”, that includes the standard deviation “ σ ” of demand over supply lead time, and which Patent Owner admits “includes demand

variability,” would not be considered a characterization of demand uncertainty; which appears to be Petitioner’s argument.

Based on our review of the Petition, supporting evidence, and Patent Owner’s arguments, we determine that there is a reasonable likelihood that the above listed claim elements are taught or suggested by Graves.

b) Demand Bias

Claim 1 also requires:

calculating, by a computer, an inventory target for a node of a supply chain; by:

...

establishing the demand bias of the demand at the node; and

determining the inventory target of the node based on the demand stock and the demand variability stock in accordance with the demand bias.

As discussed above, Petitioner argues that Graves teaches calculating an inventory target based on the demand stock and the demand variability stock. Pet. 50, 55. Petitioner argues that the combination of Graves and Winqvist teaches establishing the demand bias and calculating the inventory target in accordance with the demand bias. *Id.* at 53–56. Patent Owner argues that that teachings of Graves and Winqvist are incompatible and that the Petition fails to show a reasonable expectation of success in the combination of Graves and Winqvist. Prelim. Resp. 27–30, 33–44.

We first discuss Petitioner’s positions concerning demand bias and calculating the inventory target in accordance with the demand bias, and then address Patent Owner’s arguments.

Petitioner argues, and Patent Owner does not contest, that “Winqvist discloses that to ensure accurate safety stock, ‘[t]he calculated safety stock

value is to be corrected’ to account for ‘possible error factors caused by sample size and forecast errors.’” Pet. 53 (quoting Ex. 1008, 16:9–14). Petitioner argues that this is done with “Winqvist’s ‘correction factor 2’” where “Winqvist’s ‘forecast’ is a demand forecast and therefore the calculation of the degree and bias of the error provides the claimed demand bias.” *Id.* at 53–54 (citing Ex. 1008, 4:26–30, 5:19–31, 9:14–20, 11:30–12:18; Ex. 1003 ¶¶ 217, 219).

Petitioner further argues, which is contested by Patent Owner, that “a POS[]A would have applied the suggestions of Winqvist to Graves to further account for demand bias when calculating inventory targets.” *Id.* at 54 (citing Ex. 1003 ¶¶ 225–228; Ex. 1007, 3–4, 6; Ex. 1008, 12:1–13:26). Petitioner argues that “a POS[]A would have recognized that all inventory targets that are calculated based on demand would have equally benefitted by accounting for such bias and therefore Winqvist’s correction factor 2 would have applied equally to the base stock of Graves.” *Id.* at 56 (citing Ex. 1003 ¶ 228); *see also id.* at 47–48 (citing Ex. 1008, 1:13–17, 2:13–16, 5:14–18, 9:14–17, 11:30–12:18; Ex. 1003 ¶¶ 198–204) (discussing additional reasons to combine Graves and Winqvist).

(1) *Deterministic v. Stochastic Models*

Patent Owner argues that the teachings of Graves and Winqvist are incompatible. Prelim. Resp. 27–30; Sur-reply 1–3. It is argued that this is because Graves is a deterministic model and Winqvist is a stochastic model. Prelim. Resp. 27–30; Sur-reply 1–3. The parties appear to agree that Winqvist is stochastic, but disagree as to whether Graves is purely deterministic and whether a POSA would consider combining the teachings of Winqvist and Graves.

“A deterministic model is one with known or certain variables,” while “stochastic models . . . include random or uncertain variables.” Prelim. Resp. 27 (citing Ex. 2019 ¶¶ 47–48). There does not appear to be any disagreement concerning the difference between deterministic and stochastic models.

Much of the disagreement over Graves (*see e.g.*, Prelim. Resp. 28; Reply 1–2; Sur-reply 1), surrounds the following teachings from the Abstract:

In this paper we develop a framework for modeling strategic safety stock in a supply chain that is *subject to demand or forecast uncertainty*. . . . Our assumptions allow us to capture the *stochastic nature of the problem and formulate it as a deterministic optimization*.

Ex. 1007, 1 (emphase added).

Patent Owner argues that “Graves purposefully makes assumptions that remove the uncertainty from its calculations—it converts stochastic variables into deterministic ones. Ex. 2019 ¶¶ 49-51. Graves is thus a deterministic model. *Id.* ¶¶ 49-51, 55.” Prelim. Resp. 28. For example, Patent Owner argues that the maximum demand over replenishment time “ $D_j(\tau)$ ” or upper demand bound “shows how Graves converts a stochastic measure of demand into a deterministic one.” *Id.* Thus, after the calculation is made the uncertainty is removed as the “the upper demand bound . . . is a certain number.” *Id.* at 29 (citing Ex. 2019 ¶ 50).

Though the final result is a certain number, i.e., the amount of desired inventory (*id.*; *see also* Sur-reply 2–3), it is unclear why this would mean that a POSA would not consider the teachings of Winqvist to improve Graves’ model. *See* Reply 2–3. As noted by Patent Owner, Graves starts with stochastic variables and has developed a model that attempts to get the best estimate in the conversion to a deterministic model. Prelim. Resp. 28.

Thus, it is unclear why a POSA would not consider the stochastic variables from the combined teachings of Winqvist and Graves when developing an improved deterministic model as outlined in the Petition. Because Graves starts with stochastic variables it is not clear why the teachings of Winqvist and Graves would be incompatible.

Based on our review of the Petition, supporting evidence, and Patent Owner's argument, the Petition appears to sufficiently outline and provide support for why a POSA would combine the teachings of Winqvist and Graves. We further determine that there is a reasonable likelihood that the above listed claim elements are taught by the combination of Graves and Winqvist.

(2) *Expectation of Success*

Patent Owner argues that the Petition fails to show a reasonable expectation of success in the combination of Graves and Winqvist. Prelim. Resp. 33–44. In particular, Patent Owner argues that “[a] POSA would not know how to make the Graves model work with Winqvist’s demand bias correction factor. *Id.* at 40 (citing Ex. 2019 ¶ 56). Patent Owner argues that the Petition does not outline how the combination would actually work, i.e. in the specified equations. *Id.* at 40–41, 43. Patent Owner outlines a number of considerations that a POSA would have to make and argues that a POSA would not know how address these considerations. *Id.* at 40–41.

Patent Owner’s declarant also testifies that “It is my opinion that a POSA would not have had a reasonable expectation of success in combining Winqvist’s stochastic correction factor 2 to the deterministic Graves model.” Ex. 2019 ¶ 56. This is followed by a detailed explanation of why the declarant feels this way. *Id.* ¶¶ 56–57.

Though we agree with Patent Owner that the Petition does not appear to use the magic words “reasonable expectation of success,” a reasonable expectation of success is implied throughout the Petition’s discussion on reasons to combine. See Pet. 47–48, 54–56. Further, Petitioner’s declarant testifies that the combination of Graves and Winqvist in this regard “would have yielded predictable results;” “would have been within the predictable and ordinary level of skill of a POS[ITA];” and that “[a] POS[ITA] would have further had a reasonable expectation of success in making such a modification because both of these references describe calculating optimal inventory targets for a supply chain management system.” Ex. 1003 ¶ 204.

Though Patent Owner offers contrary testimony (see Ex. 2019 ¶¶ 56–57), we determine that the Petition sets forth a reasonable likelihood of success on this issue and thus this dispute is best left for trial after further development of the record.

c) Supply Parameter

Claim 1 also requires:

changing, by the computer, a supply parameter associated with the node, the change in the supply parameter associated with a supply parameter cost or a supply parameter benefit;

adjusting, by the computer, the supply parameter associated with the node, when the benefit of the supply parameter exceeds the cost of the supply parameter; and

adjusting, by the computer, the inventory target of the node based on the adjusted supply parameter.

Petitioner argues that these elements of claim 1 are taught or suggested by the method of Graves. Pet. 57–60. For example, Petitioner argues that Graves teaches changing the supply lead time and “compar[ing] the investment required to reduce a lead-time versus the cost savings from

the reductions in pipeline and safety stock cost.” Pet. 57 (emphasis omitted) (quoting Ex. 1007, 12); *see id.* at 57–59. Petitioner further argues that “a POSITA would have recognized that a reduction in the lead-time (a change in period τ) would have resulted in a recalculation of the demand over lead-time, thus changing the inventory target (base stock).” *Id.* at 60 (citing Ex. 1003 ¶ 237).

Patent Owner does not contest the cited teachings of Graves at this stage. *See generally* Prelim. Resp. Based on our review of the Petition and supporting evidence, we determine that there is a reasonable likelihood that these claim elements are taught by Graves.

d) Conclusion

After our review of Petitioner’s assertions with respect to claims 1, 9, and 15, the supporting evidence, and Patent Owner’s responsive arguments, we determine that Petitioner has established a reasonable likelihood of prevailing.

4. Claim 3

Petitioner argues that the combination of Graves and Winqvist renders obvious claim 3. Pet. 60. Patent Owner does not separately address claim 3. *See generally* Prelim. Resp. After our review of Petitioner’s assertions with respect to claim 3, and the supporting evidence, we determine that Petitioner has established a reasonable likelihood of prevailing.

H. 35 U.S.C. § 103(a) – Graves, Winqvist, Coyle, MIT, Schroeder

Petitioner argues that dependent claims 2, 4–8, 10–14, and 16–20 would have been obvious over the combination of Graves and Winqvist with one or more of Coyle, MIT, and Schroeder. Pet. 65–76. Patent Owner does not separately address these contentions. *See generally* Prelim. Resp.

After our review of Petitioner’s assertions with respect to claims 2, 4–8, 10–14, and 16–20, and the supporting evidence, we determine that Petitioner has established a reasonable likelihood of prevailing.

I. 35 U.S.C. § 103(a) – Agarwal, Liao

Petitioner argues that the combination of Agarwal and Liao renders obvious claims 1, 3, 9, 15. Pet. 5–18. Patent Owner argues that the combination does not teach demand bias. Prelim. Resp. 13–18. For the reasons expressed below, we determine that Petitioner has not established a reasonable likelihood of succeeding in showing that claims 1, 3, 9, 15 are unpatentable over the combination of Agarwal and Liao.

1. Agarwal

Agarwal discloses an “inventory management system and method for maintaining an optimal level of inventory.” Ex. 1004 ¶ 14. One of Agarwal’s embodiments concerns inventory optimization in “lumpy demand” situations. *Id.* ¶¶ 158–195. Lumpy demand refers to cases where demand for a product is sporadic, such as during product promotions or the holidays, and not readily predictable. *Id.* ¶ 159.

Agarwal discloses a method for calculating safety stock in lumpy demand situations, which considers undershoot. *Id.* ¶ 191. Undershoot is “the extent that an actual order point is below” “a planned order point,” and can be significant in lumpy demand situations. *Id.* ¶ 180.

2. Liao

Liao discusses how lead-time is an important consideration in inventory management systems, and how it can affect customer service level, investment in safety stock, and the ability of a company to respond to changes in the supporting environment. Ex. 1005, 7. Liao proposes an inventory model that can be used “to determine the length of the lead time

that minimizes the expected total relevant cost.” *Id.* This model allows a buyer to select a lead-time that minimizes cost and provides suppliers with a way of setting flexible lead times to meet customer demand. *Id.*

3. *Claim 1*

Petitioner relies on the combination of Agarwal and Liao for the features of independent claim 1, and then relies on essentially the same discussion for the related aspects of independent claims 9 and 15. Pet. 15–18. Thus, we only address claim 1 in our analysis below.

As noted previously, Claim 1 requires, *inter alia*:

calculating, by a computer, an inventory target for a node of a supply chain; by:

...

establishing the demand bias of the demand at the node; and

determining the inventory target of the node based on the demand stock and the demand variability stock in accordance with the demand bias.

The Petition argues that Agarwal’s teaching of undershoot meets the demand bias limitations. Pet. 10. Petitioner argues that

Agarwal’s “undershoot” of the planned order point causes the estimated demand to differ from the actual demand that needs to be satisfied due to additional demand that accrues during the delay period. EX1003, ¶¶88-89. A POS[]A would have recognized that the undershoot that compensates for lumpy demand situations (e.g., an underestimation in demand) indicates situations in which the predicted demand is different from the actual demand and therefore provides, or at least indicates, the claimed demand bias. EX1003, ¶89.

Id.

Supported by declarant testimony, Patent Owner argues that undershoot and demand bias are terms of art. Prelim. Resp. 14 (citing Ex.

2019 ¶ 33); *see also id.* at 15 (discussing the understanding of undershoot in the literature). Patent Owner argues that undershoot “describe[s] the difference between the planned order point [(i.e. when an order is placed)] and the actual order point,” while demand bias “refers to the difference between predicted demand and actual demand.” *Id.* at 14 (citing Ex. 2019 ¶ 33).

We agree with Patent Owner that the current record supports their position that undershoot and demand bias are terms of art with different meanings and that undershoot is not demand bias and does not indicate demand bias. *See* Prelim. Resp. 14–18.

For these reasons and based on the current record, the Petition does not appear to show that the combination of Agarwal and Liao teaches all of the limitations of claims 1, 9, and 15.

4. *Claim 3*

After our review of Petitioner’s assertions related to the combination of Agarwal and Liao with respect to claim 3 and the supporting evidence, we determine that Petitioner has not established a reasonable likelihood of prevailing at least because of its dependence from claim 1.

J. 35 U.S.C. § 103(a) – Agarwal, Liao, Coyle, MIT

Petitioner argues that dependent claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 would have been obvious over the combination of Agarwal and Liao with one or more of Coyle and MIT. Pet. 18–38.

After our review of Petitioner’s assertions with respect to claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 under these grounds, the supporting evidence, and Patent Owner’s arguments, we determine that Petitioner has not established a reasonable likelihood of prevailing at least for similar reasons discussed above with respect to claim 1.

K. 35 U.S.C. § 103(a) – *Agarwal, Liao, Schroeder*

Petitioner argues that claims 1, 3, 5, 9, 11, 15, 17 would have been obvious over the combination of Agarwal, Liao, and Schroder. Pet. 38–43. Patent Owner argues against the combination of Agarwal, Liao, and Schroder and that the combination fails to teach all of the limitations of the claims. Prelim. Resp. 18–26. For the reasons expressed below, we determine that Petitioner has not established a reasonable likelihood of succeeding in showing that claims 1, 3, 5, 9, 11, 15, 17 are unpatentable over the combination of Agarwal, Liao, and Schroder.

1. *Schroder*

Schroeder is a textbook on operations management. Ex. 1010, 1. It contains a chapter that discusses how forecasting methods should be selected. *Id.* at 1–11. It also discusses two measures of forecasting errors, including “the arithmetic sum of all errors, which reflects the bias in the forecasting method,” and “the absolute deviation.” *Id.* at 12. Schroeder explains that “there is no clear choice between the two methods; it just depends on one’s preference between bias and deviation.” *Id.* at 13. Though “if a forecast has both lower deviation and lower bias, then it is clearly preferred.” *Id.*

Another chapter in Schroeder covers inventory. *Id.* at 34–39. This chapter discusses how reorder points and safety stocks are calculated from various demand parameters such as demand over lead-time and demand variability. *Id.* at 37–38.

2. *Claims 1, 9, 15*

Petitioner argues that “to the extent that Agarwal does not expressly use the term “bias” or the term is otherwise construed narrowly, the Agarwal-Liao-Schroeder combination discloses establishing the demand

bias of a node (Element 1[a][iii]) and determining the inventory target in accordance with the demand bias (Element 1[a][iv]). EX1003, ¶¶182-185.” Pet. 40. The Petition does not address the other elements of claim 1. Thus, presumably, the Petition is relying on the combination of Agarwal and Liao for all of the other claim elements.

In expressing the reasons to combine Schroeder with Agarwal and Liao, Petitioner states that Schroeder’s methods would be used “in some situations” and that Agarwal’s methods would be used in other situations. *Id.* at 39–40. In particular, the Petition states that

A POS[A] would have used Schroeder’s simplified reorder point calculation (Schroeder, 33–34) in situations involving “a single product” having “no interaction with other products” to reduce computational complexity and reduce the resources for acquiring the necessary data of Agarwal’s more complex calculation while utilizing Agarwal’s calculation (as modified by Liao or Liao and Schroeder) when there is interaction between products.

Id. (citing Ex. 1003 ¶ 187; Ex. 1010, 33–34).

This arrangement of using different references for different situations creates uncertainty concerning the grounds. For example, it is not clear that the Petition sets forth a single situation that meets all of the limitations of the claims. Thus, based on the current record, it does not appear that the Petition shows that the combination of Agarwal, Liao, and Schroeder teaches all of the limitations of claims 1, 9, and 15.

3. *Claims 3, 5, 11, 17*

After our review of Petitioner’s assertions with respect to claims 3, 5, 11, and 17 and the supporting evidence, we determine that Petitioner has not established a reasonable likelihood of prevailing at least because of their dependence from the independent claims.

L. 35 U.S.C. § 103(a) – Agarwal, Liao, Schroeder, Coyle, MIT

Petitioner argues that dependent claims 2, 4, 6–8, 10, 12–14, 16, and 18–20 are obvious over the combination of Agarwal, Liao, and Schroeder with one or more of Coyle and MIT. Pet. 44–45.

After our review of Petitioner’s assertions with respect to claims 2, 4, 6–8, 10, 12–14, 16, and 18–20 under these grounds, the supporting evidence, and Patent Owner’s arguments, we determine that Petitioner has not established a reasonable likelihood of prevailing at least for similar reasons discussed above with respect to claim 1.

M. Discretion under 35 U.S.C. § 314(a)

As noted above, the parties identify the following parallel district court proceeding as involving the ’868 patent and both Patent Owner and Petitioner: *Blue Yonder Group Inc. v. Kinaxis Inc.*, No. 3:20-cv-03636-K, (N.D. Tex.) (“the parallel district court proceeding”). Pet. 77; Paper 29, 2.

Patent Owner asserts that we should exercise our discretion under 35 U.S.C. § 314(a) to deny institution even though the statutory deadline for a final determination in this proceeding would fall before the projected trial date in the parallel district-court litigation. Prelim. Resp. 48.

Notwithstanding that timing, Patent Owner contends all six *Fintiv* factors favor discretionary denial or are neutral (Prelim. Resp. 46–51), while Petitioner does not provide an extensive analysis (Pet. 72). We also note that Petitioner later filed a stipulation that “[Petitioner] will not pursue the same grounds cited in the IPR Petition, nor any other possible prior art printed publication grounds based on any reference from the IPR Petition grounds, in the [parallel district court proceeding] . . . with respect to the challenged claims.” Ex. 1022, 1.

The statutory deadline for a final determination in this proceeding would fall in the beginning of February 2023, before the district court’s projected trial setting of March 6, 2023 (*see* Pet. 76; Prelim. Resp. 48), and we determine the second and fifth *Fintiv* factors weigh against discretionary denial. *See Huawei Tech. Co. v. WSOU Inv., LLC*, IPR2021-00225, Paper 11 at 14 (P.T.A.B. June 14, 2021) (explaining that the fifth factor “favors denial if trial precedes the Board’s Final Written Decision and favors institution if the opposite is true” (internal quotation marks omitted)). Based on the evidence of record, the parties’ and district court’s investments in the district-court litigation are typical of litigation in the early stages, and we determine the third *Fintiv* factor is neutral. Regarding the fourth factor, Petitioner’s limited stipulation that it will not assert the same grounds in the district court as those asserted here weighs slightly against discretionary denial. Finally, the sixth factor is neutral, as demonstrated by the above analysis of the merits.

On this record, we are not apprised of sufficient facts and circumstances that would lead us to discretionary denial under § 314(a).

III. CONCLUSION

For the foregoing reasons, we have determined that there is a reasonable likelihood that the Petitioner would prevail with respect to at least one claim challenged in the Petition. We therefore institute trial as to all challenged claims on all grounds stated in the Petition. At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, *inter partes* review of claims 1–20 of U.S. Patent 8,781,868 B2 is instituted on all grounds in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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