

LOGISTICS RESEARCH ARTICLES WRITTEN BY NON-NATIVE ENGLISH SPEAKERS: THE EVIDENCE FROM CORPUS TOOLS

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Abstract: The goal of this corpus-based study was to look at the word lists, collocations, and lexical bundles of logistics research articles (LRAs) in order to get a better understanding of the real English language used in the logistics area for both academic and specific purposes. The stated concerns were then investigated using four corpus tools: AntConc, Sketch Engine, ConcGram 1.0, and RANGE. A logistics journal was used to compile 21 LRAs at random. The findings revealed that the top list of words found in corpus tools differed. After that, each tool displayed a comparable list of the top 10 nouns. And the top list of lexical bundles was generated differently by each tool.

Keywords: Logistics research articles, Corpus tools, AntConc, Sketch Engine, ConcGram 1.0, RANGE

Introduction

According to Anthony (141), corpus linguistics is an applied linguistics technique that has become one of the primary methodologies used to examine language today. The use of computer software to count language patterns as part of the analysis is one of the primary elements of corpus linguistics (Anthony 141). In addition, an examination of the word lists, collocations, and lexical bundles appearing in logistics research articles (LRAs) is very important for learning the authentic English language used in the field, due to the increasing number of logistics students at both undergraduate and graduate levels to meet the need of the increased logistics business worldwide (Kovács and Kot 2016). Because multi-word phrases are thought to be a source of difficulties for non-native users while also being required to obtain native-like competency, this is the case (Nasrabady et al. 176).

The significance of word lists, collocations, and lexical bundles

It could be a beginning point for analysis to look at the frequency of word lists that occurred in each corpus program. This is because various software may show or perform a varied number of tokens, which may have an impact on the frequently used features in each study. Many academics have written about

the role of word lists, collocations, and lexical bundles in language learning. To begin with, numerous scholars have explored or recommended the importance of word lists. By constructing an academic word list, Lei and Liu said that

it may be a helpful resource for learners and teachers of medical English, as well as syllabus designers and material writers engaged in medical English education. The list may aid them in concentrating their attention and effort on only the most important medical vocabulary terms (49).

“It would always be important to find out how many of these words students already know and how many of them they do not know,” Valipouri and Nassaji said of their study’s instructional implications (256). As a result, it can lead to effective instructional practices that are adapted to the individual needs of learners (Valipouri and Nassaji 256).

Secondly, considering the importance of collocation, it is a method of merging words in a language to make natural-sounding speech and writing, according to the Oxford Collocations Dictionary. Collocations are clusters of words that occur frequently or only occasionally (Nation 525). Previous research has demonstrated the importance of collocations in language learning. The importance of collocation in vocabulary development cannot be overstated. It is also a good way to remember new words (Duan and Qin 1891). Ang et al. (127) suggested that “academic writing must be treated from a discipline-specific perspective in order to deliver effective collocation lists to EAP learners in the respective subject”. Then, according to Nizonkiza (171), “incorporating collocations into the courses may contribute to an improvement in the writing component of academic literacy”. Furthermore, Danileviciene and Vaznoniene stated that “learning collocations is beneficial since it provides a native-like style, improves writing style, and aids in the development of language proficiency” (25). In addition, Xu asserted that “the importance of collocations for EFL students is undeniable” (185) and that “it is a necessary aspect of any lexicon” (187).

Thirdly, it is necessary to mention the importance of lexical bundles. A list of different sorts of academic expressions should be employed in an integrated fashion to optimize the learners’ capacity for prompting their genre competency, as defined by Biber et al. as “sequences of word forms that typically go together in natural conversation” (990). Kwary et al. said (132) that “several studies have indicated that knowledge of these lexical bundles marks a better degree of competency than knowledge of individual words”.

Second language expert writers can use contextualized examples to understand how expressions are used skillfully and naturally by first language expert writers structurally and functionally, thereby avoiding underusing, overusing, and missing particular lexical bundles, and not resorting to their mother tongue for the expression of the bundle,

Esfandiary and Barbary concluded (41). “Instructors of writing courses and students who aspire to create and publish research articles should give special attention to lexical bundles,” Kazemi et al. said of the importance of lexical bundles (870). Moreover, Birhan’s findings showed that “lexical bundles had a good effect on students’ academic writing skills” (585). Furthermore, Shin asserted that “lexical bundles can fulfill pragmatic roles in discourse to suit the most common communicative needs of language users” (2).

To date, there have been few corpus-based studies in the logistics industry that have looked at word lists, collocations, or lexical bundles though there have been numerous studies that looked into or analyzed the language used in various disciplines in research articles such as psychology (Esfandiary and Barbary 2017), chemistry (Valipouri and Nassaji 2013), social science (Lu et al. 2018), mathematics (Cunningham 2017), applied linguistics and pharmaceutical sciences (Ren 2021), biology (De Waard and Pander Maat 2012), education (Mozaffari and Moini 2014), art (Wang 2017), nursing (Mandic and Dankic 2020), engineering (Gilmore and Millar 2018), agriculture (Martinez et al. 2009), medical (Jalali and Moilni 2014), and economics (Damchevska 2019). The current research aims to close this gap by intending to explore the word lists, collocations, and lexical bundles found in logistics research articles. The following research questions were then investigated in this study.

- 1) What are the top lists of the words generated by the corpus tools?
- 2) What are the top lists of nouns generated by the corpus tools?
- 3) What are the collocations of the top-ten nouns generated by the corpus tools?
- 4) What are the top lists of lexical bundles generated by the corpus tools?

The results of this study may cause EFL students to become more aware of their knowledge of words, collocations, and lexical bundles when they use English in the logistics industry. Also, it may encourage teachers to consider using or embracing authentic language in the development of teaching strategies, teaching materials, and ESP courses.

Literature review

Software packages used in this study

The software packages employed in this study are as follows: AntConc, Sketch Engine, ConcGram 1.0, and RANGE. Firstly, AntConc, according to Anthony (2006), is a free-to-use utility with a wide range of functionalities. This program was used to investigate the word list, collocations, and lexical bundles in this study. This tool was chosen since it is a commonly used program (Lenko-Szymanska and Boulton 37-39) that can be accessed easily in the field. Secondly, Sketch Engine is another free tool for analyzing the word list, phrasal phrases, and collocations. Since 2004, the Sketch Engine has been a leading corpus pro-

gram used in language research and language learning. This is the fourth most popular tool for corpus analysis (Lenko-Szymanska and Boulton 37-39). Then, ConcGram 1.0, a program designed to look for all co-occurrences of terms in a text (Greaves 2009), is also used in this investigation. It is used to look through the word list and phrasal expressions. Finally, there is RANGE. This tool is used by the researcher to assess the text's lexical load. As a result, this program was used to investigate the word lists and phrasal expressions in this study.

Previous studies

Previous studies related to the use of corpus tools

In language studies, corpus tools or corpus software have been employed in a variety of ways. AntConc was first utilized by language researchers to investigate collocations (Ang et al. 2017; Boonraksa and Naisena 2021; Chen 2017; Low 2021; Molavi et al. 2014), as well as lexical bundles (Bal Gezegin 2019; Jalilifar et al. 2016; Yin and Li 2021). Then, Sketch Engine has been carried out for generating lexical bundles (Nasrabad et al. 2020; Subramaniam and Kaur 2021) and collocations (Du et al. 2022; Frankenberg-Garcia 2018). Furthermore, some researchers used Concgram 1.0 to investigate phraseological variation (Cheng and Leung 2012), text-initial words, clusters, and concgrams (O'donnell et al. 2012), determine keyword collocations (Molina-Plaza and Allani 2022), explore the most frequently occurring two-word and three-word concgrams (Hou 2016), and compare collocations extracted from a multilingual comparable corpus (Ruiz Yepes 2017). In addition, the RANGE program was used for lexical analysis (Hajiyeva 2015), wordlist examination (Wan-a-rom 2008), and vocabulary distribution analysis (Criado and Sanchez 2012).

Previous studies on the English for logistics business

There are only a few research studies on English in the logistics industry. To begin with, there is a study of English terms and collocations found in logistics journals with the goal of discovering the real language used in the area (Suraprajit 46). Leon then selected keywords and collocations in various text types in the maritime transport area (526), anticipating that the findings would aid in a better understanding of the field's many situational contexts and technical meanings (534). Then, in order to develop a training course, Youngyuensin investigated the demands in English communication skills as recognized by Thai personnel in the logistics company (4). The findings revealed that writing was the most difficult talent to master, and that the employees needed to enhance their English skills (35), particularly in business writing, grammar, and vocabulary, to function better in their daily jobs (37). Phuyathip also looked at the English language needs and issues of logistics professionals at a Thai international logistics firm (4). The results showed that staff members needed to develop

all four competencies including speaking, listening, reading, and writing. They were also required to acquire logistics-related technical jargon, as well as grammar, vocabulary, and pronunciation (35).

Methodology

The compilation of the corpus

There are 21 LRAs derived from *The Asian Journal of Shipping and Logistics (AJSL)* journal. AJSL is designed to be a forum for theoretical and empirical research contributions from researchers and experts in the field of shipping and logistics. It is a multidisciplinary and internationally refereed publication that publishes papers on a wide range of topics related to shipping and logistics. This journal welcomes submissions in the areas of management, finance, accounting, insurance, international business, and marketing in the sectors of Asian shipping, port, transportation, and logistics.

The selected articles compiled into the present study must be composed of Abstract, Introduction, Method, Results, and Discussion sections (IMRD) unless they must be excluded (Swales 1990).

In addition, all selected articles must be written by a non-native speaker. They must not be those whose origins are from the USA, Britain, Canada, or Australia.

Data analysis

Word lists, collocations, and lexical bundles were generated using corpus techniques. Table 1 summarizes the information.

Research question no.	Tools used for analyzing
1	AntConc, ConcGram 1.0, Sketch Engine
2	AntConc, ConcGram 1.0, Sketch Engine
3	AntConc, Sketch Engine
4	Sketch Engine, ConcGram 1.0

Table 1. summarizing the corpus tools used for all four research questions.

Results

To answer the research objectives, three corpus tools were used first: AntConc, Sketch Engine, and RANGE. The total token was calculated as follows.

AntConc	Sketch Engine	RANGE
102,191	111,397	84,890

Table 2. Total token

The varying numbers of tokens from the three tools are shown in Table 2. The findings show that the Sketch Engine has the most tokens (111,397 tokens), followed by AntConc (102,191 tokens), and RANGE (84,890 tokens), respectively. Sketch Engine's primary role is to sketch a word (Kilgarriff et al. 66), so it is possible that it can recognize words more fully than the other tools.

Research question no. 1: What are the top lists of the words generated by the corpus tools?

AntConc	ConcGram 1.0	Sketch Engine
the	port	the
of	as	,
and	ports	.
in	container	of
to	cargo	and
is	study	in
a	service	to
port	performance)
as	research	(
for	between	is

Table 3. Word lists (top ten)

The top-ten-word lists found by the corpus techniques are shown in Table 3. According to AntConc's findings, the word *the* was the most frequently used on the tool, followed by *of*, *and*, *in*, *to*, *is*, *a*, *port*, *as*, and *for*. Then, according to the finding from ConcGram 1.0, the word *port* was the most frequently recognized by the tool, followed by *as*, *ports*, *container*, *cargo*, *study*, *service*, *performance*, *research*, and *between*, respectively. Finally, according to Sketch Engine's research, *the* is the most used word, followed by a comma (,), period (.), *of*, *and*, *in*, *to*, parentheses (), and *is*.

Research question no. 2: What are the top lists of nouns generated by the corpus tools?

AntConc	ConcGram 1.0	Sketch Engine
port	port	port
ports	ports	container
container	container	study
cargo	cargo	service
study	study	cargo

performance	service	cost
service	performance	result
research	research	factor
logistics	logistics	performance
model	model	model

Table 4. Top lists of nouns

The top-ten-noun lists found by the three corpus techniques are shown in Table 4. To begin with, AntConc’s findings revealed that *port* was the most often used word, followed by *ports*, *container*, *cargo*, *study*, *performance*, *service*, *research*, *logistics*, and *model*, respectively. Second, the results from ConcGram 1.0 revealed that the word *port* was the most recognized noun, followed by *ports*, *container*, *cargo*, *study*, *service*, *performance*, *research*, *logistics*, and *model*. Finally, the Sketch Engine found that *port* was the most used word, followed by *container*, *study*, *service*, *freight*, *cost*, *result*, *factor*, *performance*, and *model*, respectively.

Research question no.3: What are the collocations of the top-ten nouns generated by the corpus tools?

Word	Collocates with
1. port	Johor, statedown, Ranong, Priok, concession
2. ports	Peripheral, owning, Malm, Ireland, Ippi
3. container	purchased, occupy, port, researched, regain
4. cargo	specializing, Hasheminia, contaminate, accelerate, commission
5. study	web, tugboats, tried, threefold, tended
6. performance	confirming, team, reinvest for, proposals, perceive
7. service	valued, quotation, free, coverage, unattractive
8. research	Vietnamese, collects, directions, worthwhile, ultimate
9. logistics	night, historically, evacuation, emergency, triad
10. model	nested, quantification, yield, well known, validate

Table 5. The collocations of the top-ten nouns from AntConc

The collocations of the top-ten nouns from the AntConc program are shown in Table 5. *Johor port, Peripheral ports, investigated container, specializing cargo, web study, confirming performance, valued service, ultimate research, evacuation logistics, and validate model* are some instances of the stated collocations.

In contrast, in Sketch Engine, the collocations with the nouns are more varied. They were divided into:

- 1) modifiers of *word*
- 2) nouns modified by *word*
- 3) verbs with *word* as complement/object
- 4) verbs with *word* as subject
- 5) *word* followed by and/or
- 6) *word* preceded or followed by prepositions.

For example, let us see the results for the word *port*. Table 6 lists modifiers of the word *port*, including *other port, Hanshin port, hub port, Osaka port, and Busan port*, among others.

Collocate	Frequency	Log Dice
other	33	10.3
Hanshin	28	10.33
hub	26	10.19
Osaka	25	10.17
Busan	23	10.05

Table 6. Modifiers of the word *port* from Sketch Engine

Table 7 lists nouns that have been modified by the word *port*, such as *port system, port framework, port body, port port, or port development*.

Collocate	Frequency	Log Dice
system	26	10.77
framework	21	10.72
body	14	10.32
port	10	8.46
development	8	9.71

Table 7. Nouns modified by the word *port* from Sketch Engine

Table 8 lists verbs that take the word *port* as a complement/an object such as *be port*, *connect port*, *involve port*, *consider port*, or *classify port*, and so on.

Collocate	Frequency	Log Dice
be	28	10
connect	16	11.06
involve	14	10.9
consider	8	9.72
classify	7	10.02

Table 8. Verbs used with the word *port* as complement/object from Sketch Engine

Table 9 presents verbs with the word *port* as the subject, such as *port be*, *port have*, *port accord*, *port act*, *port use*, and so on.

Collocate	Frequency	Log Dice
be	89	10.29
have	31	10.6
accord	5	9.5
act	4	9.4
use	4	8.86

Table 9. Verbs with the word *port* as subject from Sketch Engine

Table 10 shows the instances of the word *port* being followed by *and/or*, such as *port or port*, *port and Kobe*, *port or Hanshin*, *port and Gwangyang*, and *port and Malaysia*, among others.

Collocate	Frequency	Log Dice
port	56	12.13
Kobe	24	11.66
Hanshin	7	10.07
Gwangyang	7	10
Malaysia	5	9.55

Table 10. The word *port* followed by *and/or* from Sketch Engine

Table 11 lists the prepositions which precede or follow the word *port*, e.g.: *of port*, *port of*, *port in*, *at port*, and *to port*.

Collocate	Frequency	Log Dice
of port	171	14.21
port of	101	8.4
port in	77	6.4
at port	54	4.49
to port	49	4.07

Table 11. Prepositions from Sketch Engine

Research question no. 4: What are the top lists of lexical bundles generated by the corpus tools?

Sketch Engine	ConcGram 1.0
of the	as well
in the	as such
to the	as port
on the	port ports
and the	as shown
for the	bulk dry
the port	port classification
can be	port busan
that the	operation cargo
number of	chain supply

Table 12. Top lists of two-word lexical bundles

The top lists of two-word lexical bundles identified by the two corpus tools are shown in Table 12. The most common two-word lexical bundles in Sketch engine were *of the*, followed by *in the*, *to the*, *on the*, *and the*, *for the*, *the port*, *can be*, *that the*, and *number of*. Then, in ConcGram 1.0, the most common two-word lexical bundle discovered in the program was *as well*, followed by *as such*, *as port*, *port ports*, *as shown*, *bulk dry*, *port classification*, *port Busan*, *operation cargo*, and *chain supply*, among others.

Table 13 presents the top lists of three-word lexical bundles detected by the two corpus tools. In Sketch Engine, the most frequently found three-word lexical bundle was *the port of*, followed by *the number of*, *as well as*, *application of is*, *in terms of*, *strategic application of*, *based on the*, *shown in Table*, *in order to*, *in this study*. Then, the most common three-word lexical bundle found in ConcGram 1.0 was *cargo bulk dry*, which was followed by *operation bulk dry*, *operation cargo bulk*, *operation cargo dry*, *management port body*, *classification port framework*, *capacity transportation planning*, *service shipping container*, *osaka kobe port*, and *port as such*, among others.

Sketch Engine	ConcGram 1.0
the port of	cargo bulk dry
the number of	operation bulk dry
as well as	operation cargo bulk
application of is	operation cargo dry
in terms of	management port body

strategic application of	classification port framework
based on the	Capacity transportation planning
shown in Table	service shipping container
in order to	osaka kobe port
in this study	port as such

Table 13. Top lists of three-word lexical bundles

Discussion

AntConc, ConcGram 1.0, and Sketch Engine all discovered top-ten-word lists, as shown in Table 3. The findings revealed that AntConc displayed more articles and prepositions in the list, whereas ConcGram 1.0 more frequently displayed nouns relevant to the logistics industry, and Sketch Engine contained punctuation and prepositions in the data set.

Table 4 contains the answers to research question number two. When it came to the top ten nouns, all three programs (AntConc, ConcGram 1.0, and Sketch Engine) produced a close list, especially for terms linked to logistics, such as *port*, *container*, and *freight*. When focusing on a more precise section of speech, it could signal that there is a tiny difference. Further research could be conducted to determine the top list of verbs or adjectives that featured in LRAs or other fields.

The collocation of the top ten nouns from the AntConc algorithm is shown in Table 5. The results revealed that the collocation is most likely made up of proper nouns (*Johor*, *Ranong*, *Priok*, *Peripheral*, *Malm*, etc.), verbs (*occupied*, *researched*, *contaminate*, *tried*, etc.), and general nouns (*quantification*, *yield*, *directions*, *quotation*, etc.) The compiled corpus should be extensively cleaned by utilizing AntConc to study the collocation of the nouns. There were still some citations, references, and abbreviations in the current study, for example. As a result, such data should be removed.

The modifiers of the term *port* have generally emerged under the names of seaports, such as *Hanshin port*, *Osaka port*, and *Busan port*, according to Table 6.

Tables 5 and 6 show that regardless of whether the list is two or three words long, ConcGram 1.0 still prioritizes nouns that are collocated with the noun, whereas Sketch Engine prioritizes a preposition.

According to Table 7, the abstract nouns *system*, *framework*, and *development* appear to be the most often modified nouns by the term *port*. The findings could be used in the logistics field's education as examples of noun change. "Noun and noun modification play a vital role in academic writing since they are more widespread in academic texts than in other registers," according to Ang et al. (117). Furthermore, both native and non-native learners have found nouns and noun modification to be difficult" (Ang et al. 117).

Table 8 presents the verbs collocated with the word *port*. It was demonstrated that some verbs such as *connect*, *involve*, or *consider* imply cooperation among the parties in the field. Another item to consider when comparing the two corpus tools is that Sketch Engine provided a more detailed description of the noun's collocation. However, as previously indicated, before running the application, the compiled corpus should be regarded clean.

The top lists of 2-word lexical bundles aided by ConcGram 1.0, and Sketch Engine are shown in Table 12. ConcGram 1.0 spotted the noun collocated with the noun 60 percent of the time, but the Sketch Engine focused on a preposition (60 percent).

The top lists of 3-word lexical bundles aided by ConcGram 1.0, and Sketch Engine are shown in Table 13. ConcGram 1.0 software still prioritized the noun collocated with the noun 100 percent of the time, but the Sketch Engine gave equal attention to prepositions (100 percent).

Conclusion and implications

The current study investigates the word lists, collocations, and lexical bundles that appear in logistics research articles (LRAs) to see how the English language is utilized in the subject of logistics for both academic and practical objectives. For this investigation, the software packages AntConc, Sketch Engine, ConcGram 1.0, and RANGE were utilized as instruments. A logistics journal was used to collect 21 LRAs at random. The findings revealed that the top list of words found in corpus tools differed. After then, all the tools displayed a similar list of the top 10 words. And the top list of lexical bundles was presented differently by each tool.

Furthermore, this research has implications for English instruction in writing courses for L2 graduate students who want to submit their research articles to international logistics journals for publication. To help logistics students improve their paper writing skills, lectures should highlight word lists, nouns, and phrasal expressions, as well as their collocations, that are commonly used in international logistics journals, so that students may recognize and adapt their usages. The researcher recommends teaching top nouns, word lists, phrasal lists, and collocations in graduate-level composition courses in logistics business, logistics management, and related subjects. Students with varying writing talents will gain a better understanding of how to employ word lists, nouns, phrasal expressions, and collocations in writing a research article in the logistics sector because of this. The most common lists described earlier should be familiarized with L2 learners who are beginners in the realm of research. Collocations should be given special attention to improve the quality of their writings in the academic sense. Another item to think about in a corpus-based study is using the optimal technology for data analysis.

Limitations

Finally, while the current study demonstrates the results of employing software packages to investigate the difficulties, it also has drawbacks. The study only looked at 21 logistics research journals, which is a significant drawback. As a result, the researchers should construct a larger corpus to obtain more data in future investigations. Another restriction is that because the study only found logistics research articles, the findings can only be applied to persons who work in or are interested in the subject of logistics.

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ON NICHT-MUTTERSPRACHLERN VERFASSTE LOGISTIKARTIKEL IN ENGLISCH: DER NACHWEIS DURCH KORPUSINSTRUMENTE

Ziel dieser korpusbasierenden Studie war es, Wortlisten, Kollokationen und lexikalische Bündel von Logistikforschungsartikeln zu untersuchen, um ein besseres Verständnis für die tatsächliche englische Sprache zu erhalten, welche im Logistikbereich sowohl für akademische wie auch für spezifische Zwecke verwendet wird. Die genannten Objekte wurden dann mit Hilfe von vier Korpusinstrumenten untersucht: AntConc, Sketch Engine, ConcGram 1.0 und RANGE. Aus einer Logistikzeitschrift wurden 21 LRAs nach dem Zufallsprinzip zusammengestellt. Die Ergebnisse zeigten, dass die gefundenen Wörter im oberen Bereich der Listen der Korpusinstrumente unterschiedlich waren. Darunter zeigte jedes Instrument eine vergleichbare Liste der 10 wichtigsten Substantive an. Desweiteren erstellte jedes Instrument die lexikalischen Bündel mit den meistsgenutzten Wörtern auf eine andere Weise.

Schlüsselwörter: Logistikforschungsartikeln, Korpusinstrumenten, AntConc, Sketch Engine, ConcGram 1.0, RANGE