Although the first-generation statistical techniques provided the researchers with powerful tools for answering the managerial and theoretical questions, they are not able to assess both measurement properties and test key theoretical relationships at the same time. Furthermore, first-generation techniques are unable to analyze variables that act as the dependent and independent variables simultaneously. Therefore, SEM, the second generation multivariate analysis is used to overcome the shortcomings of firstgeneration techniques. Becker et al. (2012) stated that the majority of researchers rely on first-generation techniques due to the use of the single-item measure, but they identified that the strategic management field turned towards the development of multi-item scales and the use of SEM (Henseler et al., 2009). Partial Least Square-Structural Equation Modeling (PLS-SEM) is recommended where the research objective involves the prediction and development of theory (Hair et al., 2011). Furthermore, in the case of existing formative relations between variables, PLS-SEM is suggested as an alternative and often more appropriate to Covariance BasedStructural Equation Modeling (CB-SEM) (Hair et al., 2011). Therefore, based on the scope of this study and the proposed conceptual model, PLS-SEM is chosen to assess the proposed model.

The conceptual model is shown in Fig. 2. This study focuses on a special model containing three orders latent constructs and formative constructs as high-order constructs that can be supported by PLS appropriately (Chin, 1998; Lohmoller, 1988). This conceptual performance measurement model indicates that the aggregation effects of all three aspects of sustainability result in the incorporation of sustainability in the warehouse management system. By using this type of hierarchical model, lower-order constructs are reflectively measured by their indicators, and high-order constructs are formatively measured by their relevant variables (Becker et al., 2012). The other approach incorporated in this study is the repeated indicator approach or superblock approach, in which the manifest variables (indicators) of the first-order constructs are reused to estimate higher-order constructs (Tenenhaus and Vinzi, 2005; Wilden et al., 2013). Apart from variables that compose the proposed conceptual model, the direction of relations between variables has to be discussed. Diamantopoulos and Siguaw (2006) believed that the direction should be based on theory that specifies the content including unobservable and observable variables.

概念模型如图2所示。该研究集中在一个特殊模型上，该模型包含三个阶的潜在结构和形成性结构，这些结构可以由PLS适当地支持（Chin，1998； Lohmoller，1988）。这种概念上的绩效评估模型表明，可持续性所有三个方面的聚集效应导致将可持续性纳入仓库管理系统。通过使用这种类型的层次模型，低阶结构通过其指标进行反射性度量，而高阶结构则通过其相关变量进行形成性度量（Becker等人，2012）。纳入本研究的另一种方法是重复指标方法或超级块方法，其中一阶结构的清单变量（指标）被重新用于估算高阶结构（Tenenhaus和Vinzi，2005； Wilden等， 2013）。除了构成建议的概念模型的变量之外，还必须讨论变量之间关系的方向。 Diamantopoulos和Siguaw（2006）认为，方向应该基于指定包括不可观察和可观察变量在内的内容的理论。

Therefore, to form the inner model, the formative direction has been used to link three unobservable variables (economic, environmental and social) to the SW construct. On the other hand, form the outer model, indicators have been linked to relevant variables using reflective relation because increasing the number of variables can cause growth in the number of relevant indicators.

In order to test the reliability and validity of the model, a pilot study has been conducted in the Automotive Industry to assess the quality of the instrument. The content validity assessment is a rational judgmental process and cannot be done through numerical evaluation (Li et al., 2005). For this purpose, academicians and industrial experts have validated the coverage of the proposed questionnaire as is explained in Section 2. On the other hand, factor analysis is employed to examine the construct validity of the instruments. Therefore, all first-order constructs were analyzed separately by running the Exploratory Factor Analysis (EFA) test (Table 2). In order to test the reliability of measurements, Cronbach’s alpha is used. According to Table 2, the first-order construct can be retained, because their EFA is greater than 0.5 and also Cronbach’s alpha value exceeds 0.7 which is the minimum threshold as recommended by (Hair et al., 2010). Therefore, all constructs met the requirement of having internal consistency and construct validity. The second and third-order of the proposed model contain formative constructs, and since reliability is not an issue for the formative construct, the reliability test is not applicable for second and third orders. However, there are some other criteria that should be examined to confirm the validity and relation of the whole model. Therefore, Smart PLS software v3.1 was used to assess the relationships and validity of criteria. For this reason, the Average Variance Extracted (AVE) was employed to evaluate the convergent validity of constructs and according to Table 2, all constructs’ AVE exceeded 0.5, so the convergent validity of the formative construct was confirmed (Chin, 2010; Hair et al., Furthermore, to assess the discriminant validity, a crossloading test for the first-order constructs is applied (Wright et al., 2012). According to Table A.1 (see Appendix A), all indicators loading on their relevant variables possess greater amounts than other variables. Therefore, it can be concluded that indicators have more relation with their relevant construct other than other variables. In addition to the cross-loading test, to assess the discriminant validity, Fornell-Larcker criteria are also used as it is recommended by Hair et al. (2011) and results supported the findings. According to Table 3, the square root of AVE for any firstorder construct is higher than the correlation between this construct and the rest of the constructs in the same column and row which confirm the discriminant validity of variables. Nomological assessment is the next criteria, and according to the Hair et al. (2010) nomological test can be conducted using the correlation matrix. Table A.2 (see Appendix A) shows that the constructs are related to each other and all constructs have a strong relationship with their relevant constructs as proposed in the conceptual model. Apart from relations between constructs, the intended direction of arrows in the conceptual model must be analyzed. According to Table 4, all proposed arrows were supported, and are positively and significantly correlated to their prior constructs. Consequently, the constructs met the requirement of nomological validity by confirming the relations and signs of correlations. Furthermore, to evaluate the sample adequacy, KaiserMeyer-Olkin (KMO) test was conducted as it is shown in Table A.3 (see Appendix A). KMO test shows that the overall measure of sampling adequacy is 0.86 which exceeds the minimum acceptable value of KMO (Akter et al., 2013). According to the results, the proposed model is capable of assessing the sustainability of SWMS using SEM. The next section shows how this model will help decision-makers to weight indicators.